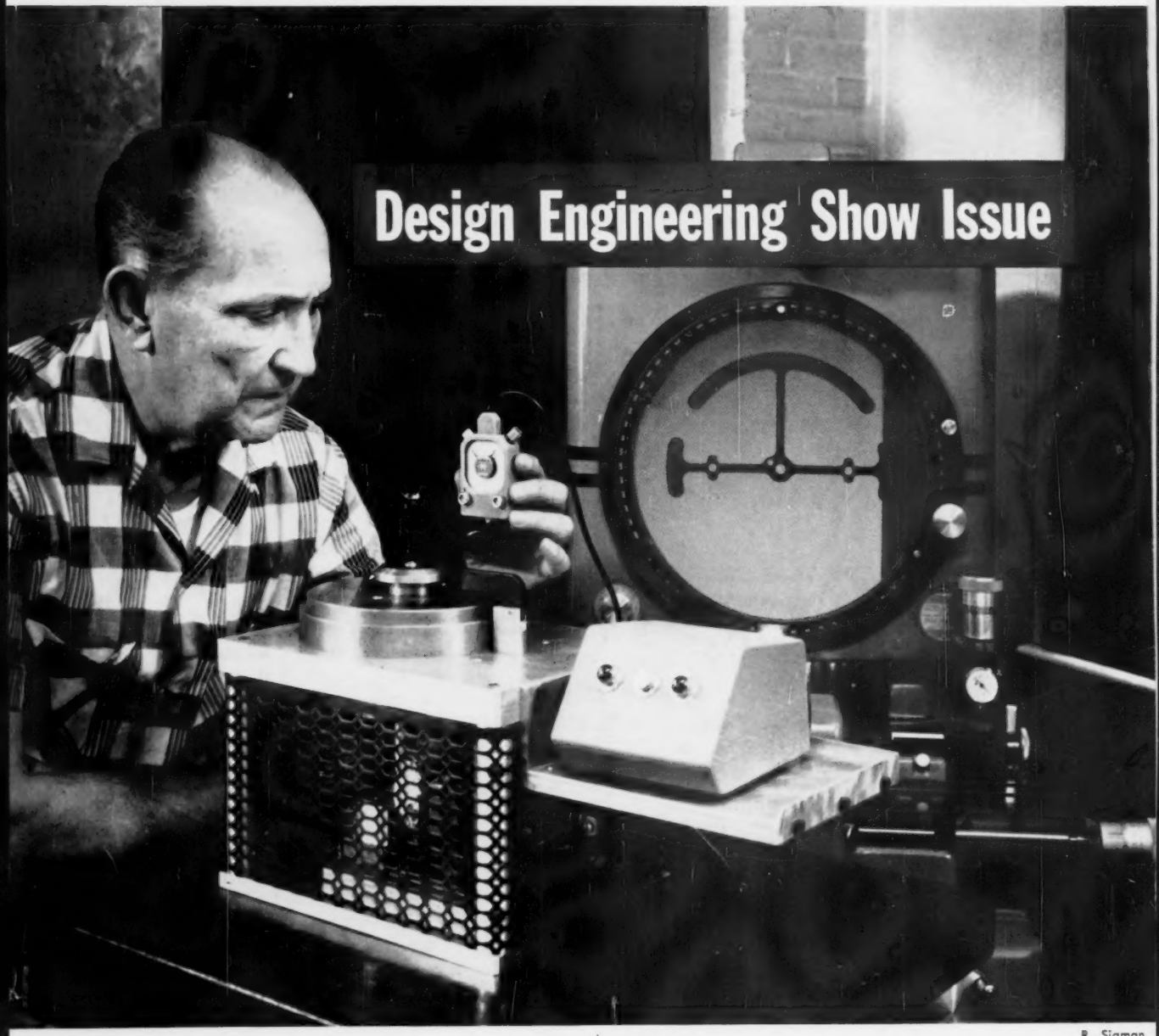
IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication MAY 11, 1961



Design Engineering Show Issue

R. Sigman

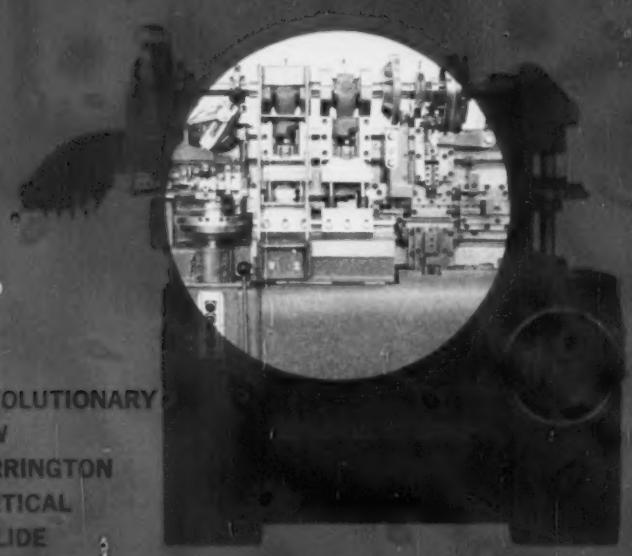
★ A Special IRON AGE Report Tells—

How to Plan for Precision In Product Design p. 105

Does Commodity Pricing Work? p. 75

Water Desalting Moves Ahead p. 82

Digest of the Week p. 2-3



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VERTICAL
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FOUR DAYS**

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PART**

Close-tolerance
enameling wiper die . . .
having 26 critical dimensions . . .
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With one machine
replacing five
progressively tooled OBI presses . . .
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This important new production tool, the Verti-Slide, offers sensational savings in direct and indirect labor costs, parts inventory, and floor space requirements . . . through elimination of secondary operations, drastic reduction in production man-hours, and lower tooling, down-time and materials handling costs. Write or call today for complete technical data . . . or a Torrington sales engineer.

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There's one best way to make parts like this...

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Steel forgings have all these advantages:

Maximum strength per pound of steel
Low overall cost
High resistance to impact
Minimum machining time
Freedom of design
Elimination of fabricating operations
Uniform response to heat treatment
Long service life

Steel

for Strength . . . Economy . . . Versatility

Your forgings supplier can tell you in detail just how these advantages can lower your costs and improve the quality of parts. Another thing he knows: **the quality of the steel is the forging's most important ingredient.** That's why so many forgers use Bethlehem steels—carbon and alloy bars they can rely on to satisfy the most demanding requirements.

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IRON AGE

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Digest of the Week in Metalworking

News of the Industry

Will Commodity Pricing Hit Steel?: Stainless muffler may bring it on. 75
Demand Lags for Lakes Iron Ore: High content imported ores popular. 77
More U. S. Firms Exhibit in Germany: An on-the-scene report. 78
Tin Price Starts to Steady: Prospects are good for stable pricing. 80
U. S. Slips in Tool Export Race: Cutting tool exports suffer most. 81
Water Desalters Fight Cost Battle: But market is attractive to many. 82
Outlook Good for Lead and Zinc: Tonnage rise likely for both in '61. 83

Engineering-Production Developments

*DESIGN ENGINEERING SHOW FEATURES:

***Plan for Precision in Product Design:** Control all working stages. 105
***Show Previews:** 124 ***Show Program:** 167 ***Exhibitors List:** 168
Complex Rotors Cast to Shape: Semi-cold process uses pure aluminum. 113
Solving Investment-Casting Problems: Switch to tailored alloys. 114
Automated System Forges Parts: Turns out 600 track links per hour. 116

Markets and Price Trends

Steel Summary: Pickup in steel demand continues to grow stronger. 177
How Well Do Purchasers Do Their Job?: More evaluation is needed. 178
Nonferrous: Copper industry expects further price increases. 184
Building Paces Farwest Steel Upswing: Continued gains are likely. 93
Sports Car Trend Takes Shape: How far it will go is big question. 91

Editorial

Anyone for Advice?
Why Keep It to Yourself 5

Metalworking Newsfront

Business Forecast 7
Metalworking Labor 9
Washington 11
International 13
Techfront 15
Market-Planning Digest 73
Report to Management 89
Spacefront 103
Steel Summary 177

Industry Trends

Automotive 91
West Coast 93
Machine Tools 95
Purchasing 178

Markets and Prices

Price Section 177
Steel Products 180
Ferrous Scrap 182
Nonferrous 184

Departments

Letters 19
Fatigue Cracks 21
Meetings and Exhibits 23
Industrial Briefs 86
Men in Metalworking 97
You Arbitrate It 101
New Patents 120
Technical Literature 121
Clearing House 194

ADVERTISING INDEX 197

Special This Week

Where Does Precision Work Begin?

Are you faced with a close-tolerance problem. If so, you've got lots of company. Tolerances are getting tighter and tighter. But design engineers are equal to the task. Our cover photo shows how automatic gages control precision lapping operations at the Industrial Products Div., Hamilton Watch Co. p. 105

Push Is On in Water Desalting

Great advances are being made in converting saline water for use. New ones are in sight. At least 28 U.S. companies are active in research or in building plants. Costs are still the big problem. But efforts are underway to bring them down. p. 82

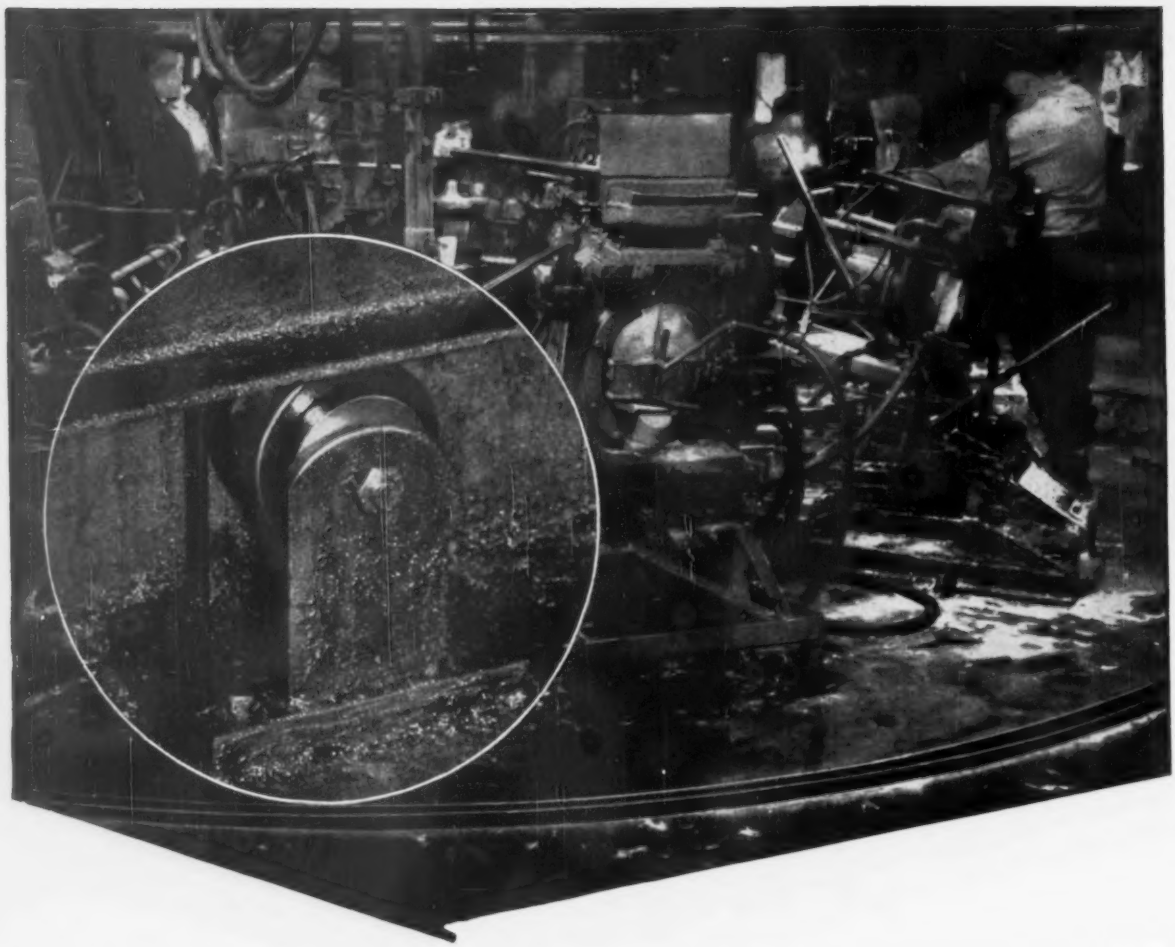
Commodity Pricing Stirs Debate

Until now, steelmakers have been united against commodity pricing practices. But they helped aluminum producers crack the can market. Now a stainless producer has adopted commodity pricing for a new muffler stock. Others worry it will spread. p. 75

Next Week

West Germany's Industrial Buildup

West Germany's industrial expansion is still running under a full head of steam. Beginning next week, a new series of on-the-scene reports tells what this means in terms of West Germany's role as an ally and a competitor for world markets.



Bearings, Inc. turned this turntable from a costly maintenance problem into a smooth, trouble-free operation!

Our customer, an aluminum foundry, designed and built this system for continuous and automatic pouring of permanent mold castings. The turntable is approximately 20 feet in diameter. Supporting the table, which weighs several tons, were 20 large, double-row bearings. The life of these bearings was only a few weeks and their cost, plus downtime, was becoming increasingly expensive.

Our bearing engineers were asked for a solution and, after an investigation, recommended a camroll bearing. Now, after many months of operation, all turntables in the plant are equipped with the bearings we recommended and there has not been a bearing failure in that period!

If you have a problem involving bearings, call the Bearings, Inc. branch nearest you for expert help. We are the authorized distributor for all the bearings we sell —your guarantee that the bearings we deliver will be of the latest manufacture and right for your application!

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Anyone for Advice? Why Keep It to Yourself?

Some of our top people everywhere are well insulated from the facts of the life that go on around them. That is the gist of what one reads in the papers these days.

Mr. Kennedy's attempt to pass part of the Cuban fiasco buck to the Press won't hold water. Everyone, from office boy to assistants in charge of all Mr. Bigs, knew the score.

That the Central Intelligence Agency fell on its face is not too surprising. Either its people were sound asleep or did not understand how the average Latin thinks.

Testimony in the electrical price fixing case and at subsequent Washington hearings points up one thing: Top executives in many cases do not know what goes on in their companies.

Leaders of industry and the President of the United States often are insulated from brusque, brutal, and biting outbursts from Devil's Advocates. There are fewer of the latter than there should be. But again, there is probably a good reason for this lack.

Security is one reason why many never argue with the boss. Why rock the boat and maybe lose your job, get demoted, or be labeled a crank? That is good advice for those who want to get ahead by default. Also, there is nothing much the matter with this behavior if you are a firm believer in letting other people get themselves out of their own messes.

Then there is the mistaken notion that the top man will not listen. Maybe the man near the top won't listen, but the top man usually does—if you can get to him and if you talk up as an equal. That, of course, is quite hard to do because it is not in accord with the trend of "getting ahead."

The president of a mortgage firm is insulated from his own business if he permits routine, impersonal form letters to go out to clients when the debt is paid off. Presidents of oil firms that dun people without finding out first if they are a triple "A" credit risk or a deadbeat are insulated. The heads of electrical companies whose middle management fixed prices were certainly insulated.

But what price silence? Probably an extra push ahead, maybe a foul-up later. But under today's mores, it is the thing.

But since today's sheep follow such a path, maybe it would be a good idea to be old-fashioned and speak your piece—when you have the facts, the enthusiasm, and the guts.

Tom Campbell

Editor-in-Chief

New

RED RING MACHINE SHAVES LARGE GEARS FASTER... MORE EFFECTIVELY

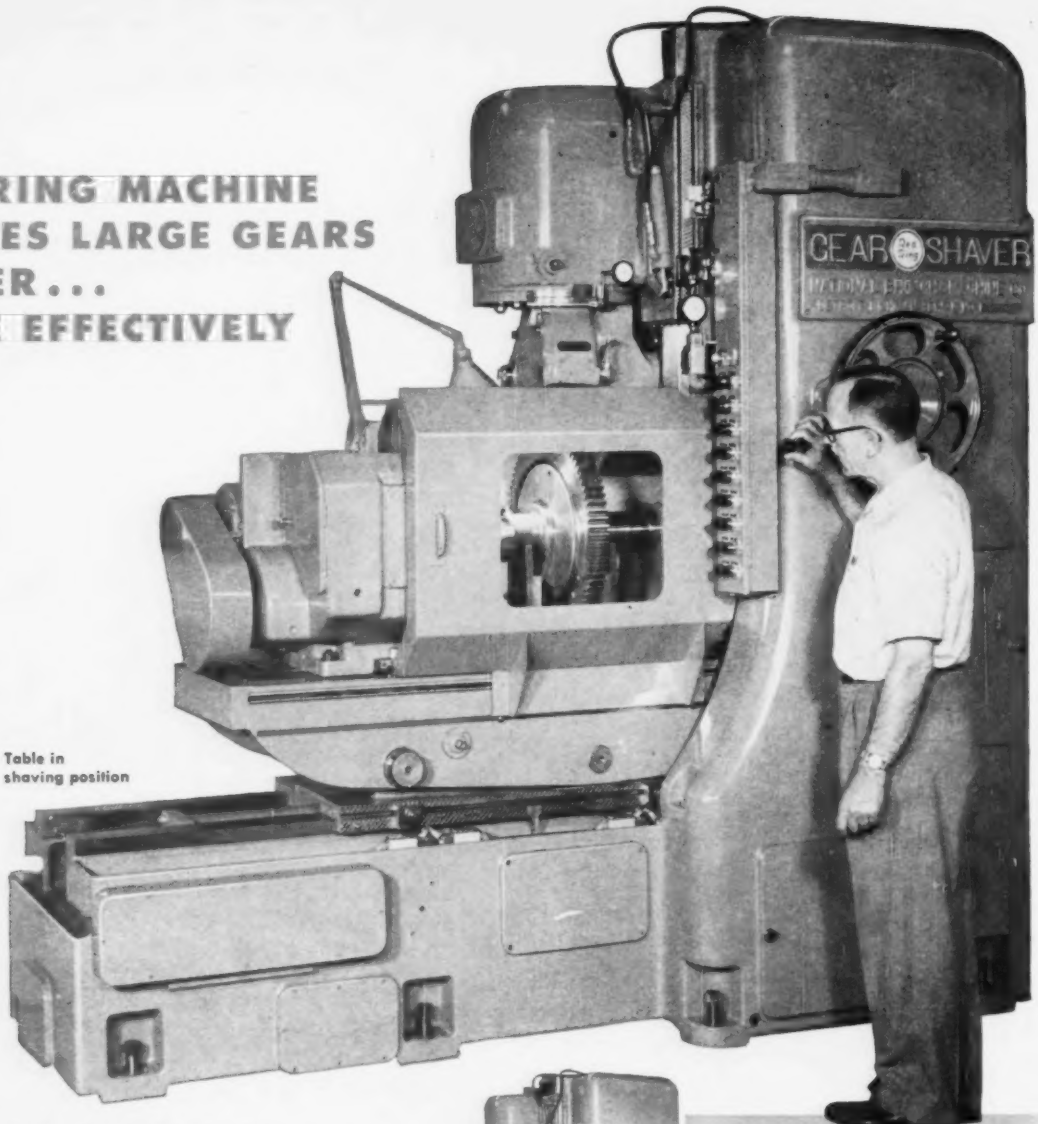


Table in shaving position

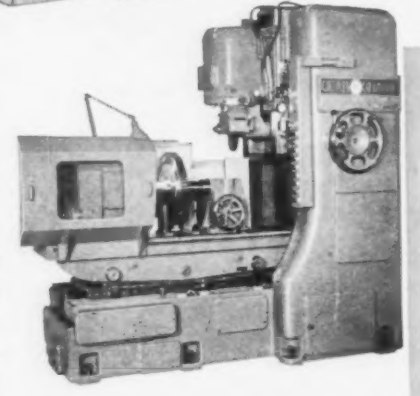


Table in loading position

Significant design innovations in the New Model GCX enable you to shave the larger, heavier gears (up to 24" Pitch dia.) with the same facility and precision as smaller gears are shaved.

Methods of loading and unloading are unrestricted. The work is loaded with the table at the extreme limit of its travel—clear of any overhead interference.

At the end of the shaving cycle, the cutter head rises in rapid traverse to clear the work and the table returns to its loading station for quick unloading.

If you manufacture such gears as are used in trucks, agricultural or ordnance equipment, ask for Bulletin S60-8 and get the full details of this new, economical method of gear shaving.

EXCLUSIVE RED RING ADVANTAGES

- **Cutter above the work permits chips to fall away from and not into the cutter teeth.**
- **Thus positioned, the cutter is not vulnerable when the work is accidentally dropped while being loaded.**
- **Cutting pressure is applied downward, taking full advantage of gravity for rigid stability.**
- **Floor space, less — Rigidity, greater**

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING, GEAR HONING AND ELLIPTOID

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING AND HONING EQUIPMENT

Housing: Vacancies and Values

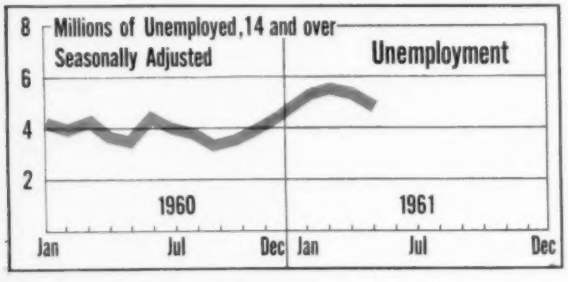
What's holding back housing? Economists are running out of answers.

One analysis approach is giving a hard look at vacancy rates of rental units. Here is how this rate has risen (4th quarter): 1958, 6.0 pct; 1959, 6.4 pct; 1960 7.6 pct. These high vacancy rates, says one economist, cause "some drag on residential construction."

Look for more "trading up" sales approaches by builders and real estate men. In 1950, about 23.6 million households (55 pct) owned their own homes. In 1960, about 33 million (60 pct) owned their own homes. Housing "pros" say home owners are more sophisticated buyers than renters. "Trade up to greater value" may be the approach to turn the tide. And "buy" values must be better than "rent" values.

High Jobless Rate Continues

There were about 500,000 less jobless in mid-April compared to a month ago. But it was seasonal factors,



not better business, that turned the trick. The seasonally-adjusted rate of unemployment at 6.8 pct in April showed no significant change for the fifth straight month.

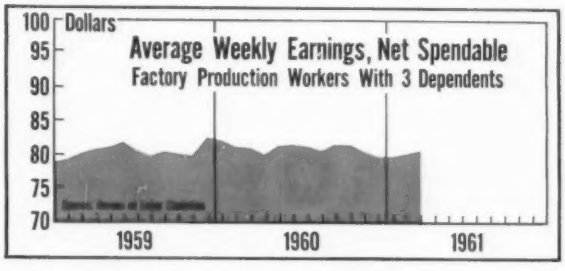
Unemployment in mid-April stood at 5.0 million. This is 1.3 million higher than a year ago. And there were 65.7 million employed in April. But this is down about 400,000 from last year.

The first need for more workers as business improves is being picked up in extra hours, not extra workers. Continued business gains should help, but not solve, the jobless problem in the first half.

Worker Earnings Up Slightly

Spendable earnings and buying power of factory workers rose slightly between February and March. The earnings pickup was due to an increase in working time. This pickup came to about 65 cents over the month, to $80.89 per week, an earning level about equal to year-ago figures.

Buying power was up 0.8 pct for the month as consumer prices remained unchanged.



Better personal earnings, along with business good news bolstering consumer attitudes, could be one of the best signs for future buying.

Man in Space: Coming GNP

A cheering report comes out of the Univ. of Michigan. Professor J. P. Wernette forecasts a GNP of $750 billion by 1969. And he thinks GNP will pass the $2 trillion mark by the end of the century. Presently, GNP hovers around the $500 billion mark.

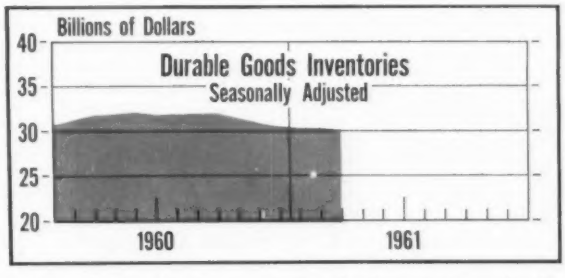
Here are some elements of the growth in the next decade, as seen by the professor. Population, up 15 pct; work force, up 25 pct; productivity, up 25 pct; real income per person, up 30 pct.

He says that "no novel programs" are needed for the U. S. to achieve this record.

Hefty Inventories Linger

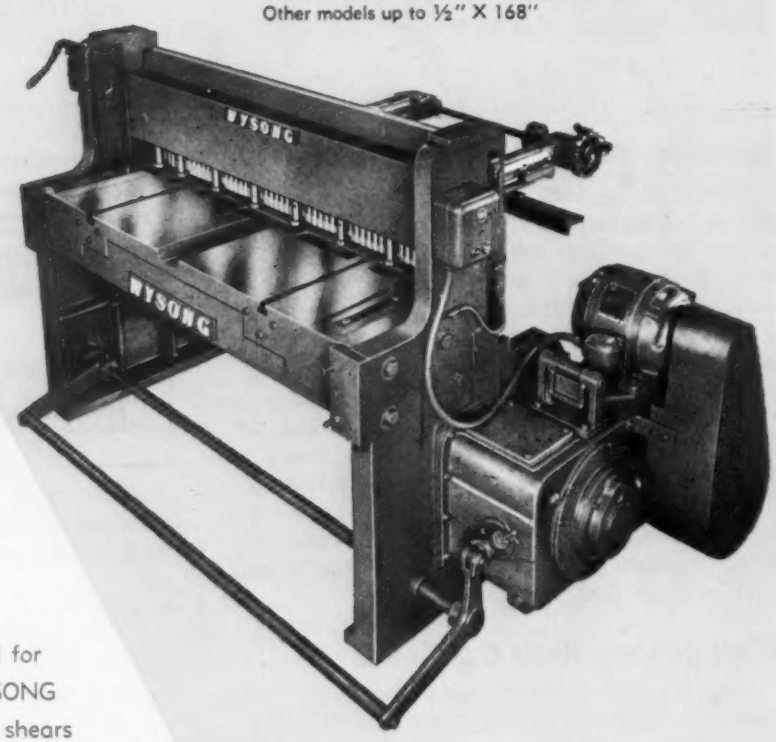
Durable goods inventories dropped $350 million in March from February. In March these inventories stood at $30.31 billion.

Improved orders for durable goods and a reluctance of purchasing men to build stocks combined to keep downward pressure on inventories.



The National Assn. of Purchasing Agents, in its April survey, picked up this reluctance to stock. Their finding: "PA's persist in holding a tight hammer lock on inventories." One sign noted in the survey: The rate of inventory reduction has declined.

MODEL 1252—Capacity 12 ga. X 52"
Other models up to ½" X 168"



New standards of accuracy are now demanded in more and more shearing operations. Frequently, blanks sheared to yesterday's accepted tolerances are today's costly rejects.

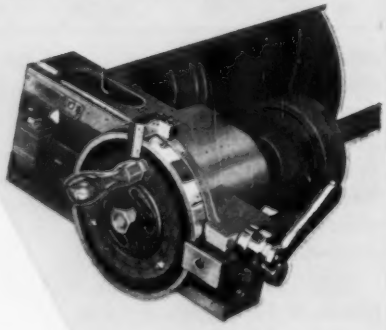
Can you meet today's demand for accuracy? You can with a WYSONG shear. It is the only line of shears equipped with a friction lock back gauge graduated to .001". Precision Ground Acme screws enable you to set the gauge on the exact thousandth that you want.

A new gibbing system, with non-metallic, score proof ways and ½° angular travel, permits closer settings of the gibs and the blades. These important factors contribute to the unsurpassed accuracy that you get with a WYSONG shear.

To meet modern demands, get a truly modern shear.

"Buy a **WYSONG** – it's **MILES** ahead"

Saving thousands ... Shaving thousandths!



This gauge is standard equipment on all models normally equipped with rear-operated back gauge. Available at extra cost on models normally equipped with front-operated back gauge.

WYSONG

WYSONG & MILES COMPANY
635 Fulton Street
GREENSBORO, N. C.

Metalworking Newsfront 2

Teamsters: Push Move Into Metalworking

National Foundry Assoc. notes that the Teamsters Union has been successful in winning representation elections in a half dozen or more foundries in the last year.

But, it comments, "To say they are difficult to deal with would be an understatement. They won't, or do not want to, understand that there are differences between a trucking firm and a foundry."

Assoc. Industries of Minneapolis has also noted increased Teamster activity. The union is sending out a "Message to the Unorganized."

The "Message" says: "We are attempting to cover all the unorganized plants with this questionnaire and would appreciate your cooperation. . . .

"We firmly believe all working men and women benefit by being members of organized labor. We are interested in organizing only the unorganized. If you already have a union representing you, please ignore this questionnaire.

"Our organization is the largest and most powerful international union in the entire labor movement. We are growing stronger each day, gaining many new members with increased benefits for all Teamster members."

AFL-CIO: Split Grows Wider Between Unions

A public battle between warring factions within the AFL-CIO is scheduled for today in Washington. The National Labor Relations Board is hearing a case said to be widening the split between craft unions and industrial unions of the labor federation.

The NLRB will decide if it should order a bargaining rights election on a plant-wide basis, as sought by industrial unions, or restrict voting to a small unit of maintenance men, backed by the craft unions.

Three departments of the AFL-CIO will tangle in arguments before the board. They are the Metal Trades Dept., Industrial Union Dept., and the Building and Construction Trades Dept.

Signs Point To Tough Bargaining in Steel

A check of unions and management by interview and analysis of speeches indicates a tough bargaining session next year in steel. Each side privately accuses the other of not understanding its position. Independent consultants see a tough hassle shaping up.

URW: Win Wage Hike At Goodyear

Goodyear Tire & Rubber Co. has signed a two-year wage pact with the United Rubber Workers Union. Over the life of the contract some 20,000 employees will receive wage increases ranging up to 14.5¢ per hour.

Minimum Wage Bill Passed

The bill calling for a $1.25 minimum hourly wage, long wanted by President, finally passed the Senate and the House last week. President Kennedy has already signed the measure.

The Senate approved the compromise bill by a margin of 64 to 28. Later the House voted the measure through, 230 to 196. The compromise bill was necessary when the Senate and House first approved different versions of the bill. A House-Senate conference committee drafted the compromise bill which passed last week.

An Administration supporter of the bill credits its success to "a lot of hard work by a lot of people." Rep. William Ayres (R., O.), who led the opposition, narrows the reason down to "We don't have the White House."

The vote is considered a personal victory for the President. While a Senator last year, he supported the measure, but it was defeated.

The new law, effective four months after the President signs it, broadens wage coverage. It's the first time Congress has expanded coverage of the Fair Labor Standards Act since it was passed in 1958.

Here are the provisions of the new measure:

The minimum wage goes to $1.15 for those already covered by the Act. It will be $1 for the 3.6 million newly covered.

A $1.25 minimum will go into effect two years later for those presently covered. Four years later the newly covered will get $1.25. Those newly covered will also have an intermediate increase to $1.15 after three years.

The new categories covered, a vital issue in debate on the bill, include 2.1 million workers in large retail and service enterprises, as well as many gas station workers, construction workers, transit workers, and seamen.

CINCINNATI

FILMATIC

WHAT'S YOUR FIRST CHOICE?

Cincinnati helps you select the best of 5 methods of precision cylindrical grinding... Let's consider

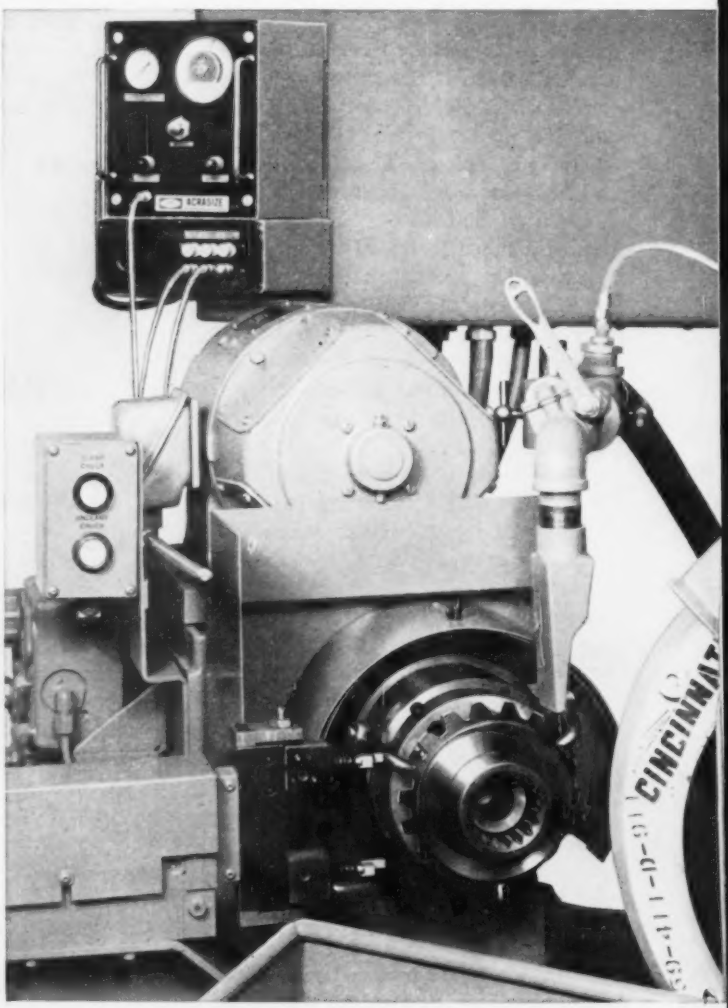
CHUCKING

Borderline applications are common for every machining method. Choice of the right one is contingent upon experience and the impartial approach to similar methods and types of equipment. That's why Cincinnati Grinding Specialists can spot the appropriate grinding application so quickly. These men are thoroughly familiar with and can recommend:

Centertype grinding *(plain, universal, gap, roll)*
Centerless grinding
Micro-Centric grinding
Angular wheel slide grinding
Chucking grinding

Let's consider chucking grinding, and the many reasons why Cincinnati can give you the finest machines and engineering service for this type of work. First of all, the grinding wheel spindle runs on Cincinnati's famous FILMATIC bearings, over 99% of which have never required adjustment or replacement. A super-accurate headstock spindle puts Cincinnati chucking grinding in the precision accuracy bracket of other methods. Automatic dual rate infeed (standard equipment) combines rapid metal removal with accurate sizing. The two-spindle headstock is recommended for difficult-to-load parts. With this type of equipment, loading and grinding proceed simultaneously.

Cincinnati's Cimtrol Division engineers the gaging equipment, giving you the advantage of single responsibility. "Jump-on" gaging, a unique type of size control, is one of the profitable features of the CINCINNATI Chucking Grinder illustrated at the right. Other machines and the types of work they are performing are found in catalog No. G-685. May we send you a copy? **Grinding Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



"Jump-on" gage unit, a product of Cincinnati Milling's Cimtrol Division, calls the signals for sizing and automatic cycle grinding. This CINCINNATI FILMATIC No. 2 Chucking Grinder is arranged to grind four sizes of parts.

Part name ..... Bevel gear
Operation ..... Grind diameter and adjacent face
Production ..... 72 per hour

PRECISION GRINDING MACHINES: CENTERTYPE • CENTERLESS • MICRO-CENTRIC • ROLL • CHUCKING • CENTERLESS LAPPING

CINCINNATI®
GRINDING MACHINE DIVISION

★ For Defense: Better Tools

The government has started a huge equipment replacement program for the nation's military departments. It is expected to mean purchase of hundreds of millions of dollars of new machinery and equipment.

The IRON AGE learned that the modernization program, with its emphasis on metals and metalworking equipment, is being studied by the Defense Dept. and other agencies.

It is forecast that large scale replacement will begin in 1963.

The Navy has already begun to move. Though the Pentagon won't confirm it, it is reported military budget men will seek more than $200 million next year for new equipment for naval shipyards.

Part of the Navy funds would go for new processes to fabricate high-tensile alloy steels for nuclear powered warships and submarines.

Congressman Frank Kowalski (D., Conn.), whose tool bank plan is getting attention in Washington, told The IRON AGE that replacement plans are being studied along with steps to get rid of surplus military equipment held in storage since World War II.

The Navy is already planning to ship enough surplus machine tools, equipment and machinery to South America to modernize 16 shipyards in such countries as Brazil, Chile, Venezuela, and Peru.

Rep. Kowalski says:

"One of the objectives of the tool bank is to move surplus tools out of the Defense Dept. to underdeveloped countries. We should have a program to look at shops, shipyards and arsenals to see what should be pulled out and replaced with new equipment.

"A replacement program is an integral part of the plan."

■ Govt. Rushes To Aid Small Businessman

Increasing small business failures in the U. S. is leading to a rash of moves to help the independent businessman.

The Administration will give small businessmen a bigger share of defense contracts. Other aid bills are coming. The latest legislative move was by Sen. Hubert Humphrey (D., Minn.). He introduced legislation which would:

1. Provide a graduated income tax on corporations, allowing up to one-third tax reduction for companies with annual earnings below $10,000.

2. Protect the rights of small businesses to sue for triple damages under antimonopoly laws.

3. Prohibit "loss leader" sales—at less than delivered cost.

4. Authorize disaster loans for small businesses displaced by Federal highway construction programs.

■ Local Groups Rule Depressed Area Aid

Metalworking industries eyeing Government aid by locating in depressed areas will have to apply through economic development groups in the areas.

These groups will seek shares of the new $451 million program, through the newly formed Area Redevelopment Administration of the U. S. Commerce Dept.

The new program will help areas which have worked up a package of products, instead of just one. Private companies will become part of the package.

■ Pollution Action

An expanded water pollution control bill will affect industry in several ways. The act would double the $50 million a year Federal funds for building sewage facilities.

On the other hand, it would permit a Federal crackdown on industries polluting lakes or streams around plants.

■ Pre-Merger Bill Stirs Three-Way Reaction

The battle over pre-merger notification is on in Washington.

Congress now is mulling over testimony given last week at hearings on a bill requiring companies to give the government a two-month notice of proposed mergers.

Rep. Wright Patman (D., Tex.), sums up the Congressional view. He says that while the bill would prevent mergers tending toward monopolies, it would not affect "the hundreds of small mergers occurring each year."

Avoid Action—Under Secretary of Commerce Edward Gudeman gives the Administration view. He says the bill would help U. S. companies avoid mergers which result in "costly and harmful" Government antitrust action.

The businessman's stand is summed up by George G. Hagedorn, spokesman for the National Association of Manufacturers. He says premerger notification is "unnecessary and undesirable." He adds that it would impose new "impediments, costs and requirements and in no way further the aim of antitrust laws."

AGAIN-

Revere helps "fit the metal to the job"

AND A COMMUTATOR MANUFACTURER SAVES ON BOTH MATERIAL COSTS AND OVERALL COSTS WHILE PRODUCING A SUPERIOR PRODUCT

The hub of the small commutator you see above originally was made of a ferrous metal. Certain problems cropped up due to the fact that the rod from which the hubs were fabricated, not only had to be drilled, but it also had to be able to withstand a flanging operation. The engineering department of Dayton Precision Manufacturing Company called in one of Revere's Technical Advisors for consultation.

After a thorough study of the problem Revere Brass Rod of a certain alloy was recommended and samples were furnished. The machinability of the rod was found to be outstanding, being readily and speedily drilled. Also it withstood the flanging operation . . . a set of manufacturing conditions where only brass, the right kind of brass, outshines all other metals and alloys.

Final score: The low first cost of the brass rod, plus its superior machinability, resulted in a more satisfactory product without the penalty of higher costs. A further advantage to the manufacturer was the added sales appeal of the brass hub.

And there you have another example of how Revere in collaboration with the manufacturer helped, "fit the metal to the job," which resulted in a better part at the least possible cost. Why don't you take advantage of this kind of service?

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Ave., New York 17, N. Y.

Mills: Rome, N.Y.; Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles, Riverside and Santa Ana, Calif.; New Bedford and Plymouth, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities.

Distributors Everywhere

Export Demand May Shift This Year

U. S. products were shipped to Europe, Japan and other Eastern Hemisphere nations at near record levels last year. But, according to

the Dept. of Commerce, exports to Canada and Latin America "lacked buoyancy."

This is how 1960's exports shaped up: Total non-military shipments rose to a new high value of $19.6 billion. This upswing brought the U. S. share of the world market up to 20 pct.

Meanwhile, U. S. imports dipped last year from 1959's level of $15.2 billion to $14.7 billion.

The large export gains in Europe and Japan were the result of increased industrial activity in those areas. However, slow business activity in Canada, political unrest in Cuba and a recession in Venezuela slowed shipments to those nations.

Canada will probably be a bigger customer for exporters this year. Its economy is picking up, prices are stable and demand for American goods is reportedly increasing.

GATT Talks Bog Down

International tariff negotiations in Geneva, according to a U. S. Tariff Commission official, are "up in the air." The General Agreement on Tariffs and Trade (GATT) meeting, at which nations make tariff concessions, is bogged down in disagreement.

The actual trading of concessions by the U. S. and other GATT members is scheduled to get underway next month. But the Commission official says trading is just as likely to be held up for several months.

Raising and lowering of U. S. and foreign metal and metalworking item tariffs and trade barriers are involved in the negotiations.

Diplomats Undergo Business Training

The U. S. is placing new importance on the role of the diplomat in international trade.

Dept. of Commerce has "revitalized" a training program for new foreign service officers and initiated a new program for mid-career officers.

Purpose: To help build a "concept" of international trade. A Commerce spokesman told The IRON AGE that "students" are taught the "philosophy of private enterprise under the democratic government . . . as it relates to the international field."

Strong emphasis is given in both courses to marketing methods. "It is imperative," said the spokesman, "that our foreign service officers understand something about marketing if we are to expand trade overseas."

Norway Plans For Industrial Growth

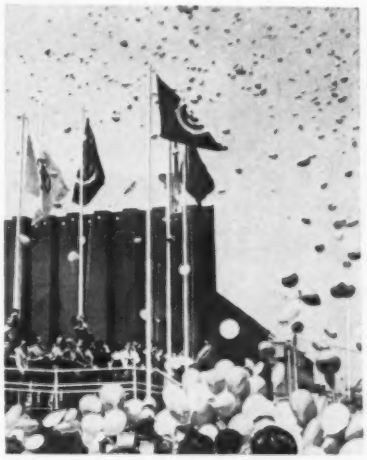
Norway has a new industrial development plan, reports the Continental Report, a business newsletter published in West Germany.

Primary target: To boost the gross national product by 17 pct in four years and to boost industrial production 20 pct by 1965.

'Hard Sell' Method Used at Fair

The U. S. is using "hard sell" techniques at the Fourth International Trade Fair in Tokyo. And close to two million people are expected to sample the technique before the fair closes.

The U. S. pavilion at the fair opened several weeks ago and already close to 500,000 people have viewed American merchandise displays. The schedule provides alternate days for businessmen and the public to tour the exhibitions.



TRADE FAIR: A "hard sell."

U. S. displays are supplemented with the Trade Information Center. The center is being handled by the Trade Mission of the Bureau of Foreign Commerce.

Machinery Exports

Largely because of a sharp advance in chain saw shipments, exports of U. S. woodworking machinery increased 25 pct last year from 1959's level. Total value of the 1960 exports was $26.2 million.

A Tinnerman T-Marked Original...

Dual SPEED NUTS® open door to 20% savings on as-assembled cost

Gibson refrigerator door hinges are held in place with new cost-cutting, time-saving twin-type SPEED NUTS. They replace 3/16" plate hinge retainers which had to be drilled and tapped for machine screws.

Gibson Refrigerator analysts estimate that special twin-type SPEED NUTS save 14% on the cost of each hinge retainer assembly, 20.5% on the as-assembled cost. Labor is reduced by half. Former problems with cross-threading and stripping are eliminated . . . SPEED NUTS and A-type screws go together naturally every time—and faster!

The T-mark of quality and dependability identifies the more than 10,000 variations of SPEED NUT brand fasteners. From this unlimited selection come many saving opportunities for you. Ask your Tinnerman representative to arrange for a free FASTENING ANALYSIS of your product. An engineering service that may produce similar savings for you.

You'll find Tinnerman under Fasteners in your SWEET's Product Design File and in the "Yellow Pages." *Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio.*

TINNERMAN
Speed Nuts®
Look for the Tinnerman "T"

OTHER T-MARKED SPECIALS

SPECIAL "J" SPEED NUT cuts production time in half for a major gas range manufacturer. Simplified right-angle panel or brace attachments for a variety of appliance, cabinet, and instrument applications. Live-spring tension means a vibration-proof grip.

SNAP-IN FIXTURE FASTENER developed specially for Imperial Lighting Products Co., trimmed 80% off lighting fixture assembly time. Once fastened to the ceramic socket, this unique SPEED NUT snaps quickly into the fixture base...replaces three parts.

PUSH-ON SPEED NUT anchors latching bars on steel desks, reduces material and assembly costs by 50%. Push-on SPEED NUTS can be attached on studs, rivets, or tubing in a split second, and eliminates need for threaded parts . . . saves time and money.

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S.A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano Simmonds GMBH, Heidelberg.

Stainless Gains Strength

Ultra-cold rolling methods boost the tensile and hardness values of all austenitic stainless steels. Explosive forming and cold bending in subzero environments also produce startling results. High-energy blasts step up strength and hardness levels. On the other hand, austenitic stainless alloys become easier to bend as you lower the temperature to that of dry ice.

Water-Pollution Control

Look for the water-pollution issue to warm up again. Scientific studies, now being made by a Midwestern university, will reveal how the Great Lakes purify themselves through currents, winds and other natural means. Results will pinpoint what must be done to control sewage, industrial wastes and other contaminants in order to provide the nation with future pure-water resources.

Flexible Electro-Spray

Speed and versatility highlight a newly-installed electrostatic paint-spray system at Kelvinator's Grand Rapids plant. Part sizes and shapes pose no problem to the conveyorized line. Reciprocating bells apply uniform coatings. Flexibility is the byword. The line handles mixed sizes of refrigerator cabinets and doors.

Resists Corrosion

Synthetic latex offers a way to control corrosion on car bodies and other metal surfaces. Designed for use as an air-dry primer, a new synthetic protects structural steels, farm implements and vending machines. Metals coated with this primer show no traces of corrosion, even after 100 hours of exposure to salt spray.

Semimetals in Computers

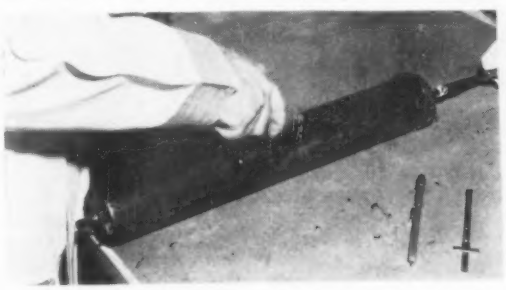
Metals that aren't very metallic, notably antimony and bismuth, may make electronic computers smarter than ever. A new type of switch, made of semimetal, can theoretically operate in a billionth of a second. These switches will reduce operating costs and open up a whole new area for advances in electronics. Semimetal regulators function at temperatures down to –450°F. Atoms, which normally vibrate vigorously, are almost completely still at the supercold temperatures.

Needle Tubes for Hot Work

Small stainless steel tubes are serving in an increasing number of industrial applications. One company uses standard 21-gage hypodermic-needle tubing as an electro-mechanical connector in instant-heat soldering guns. With 0.032-in. OD and 0.020-in. ID, these tiny tubes withstand prolonged heating-cooling cycles up to 1300°F.

Speeds Pipeline Assembly

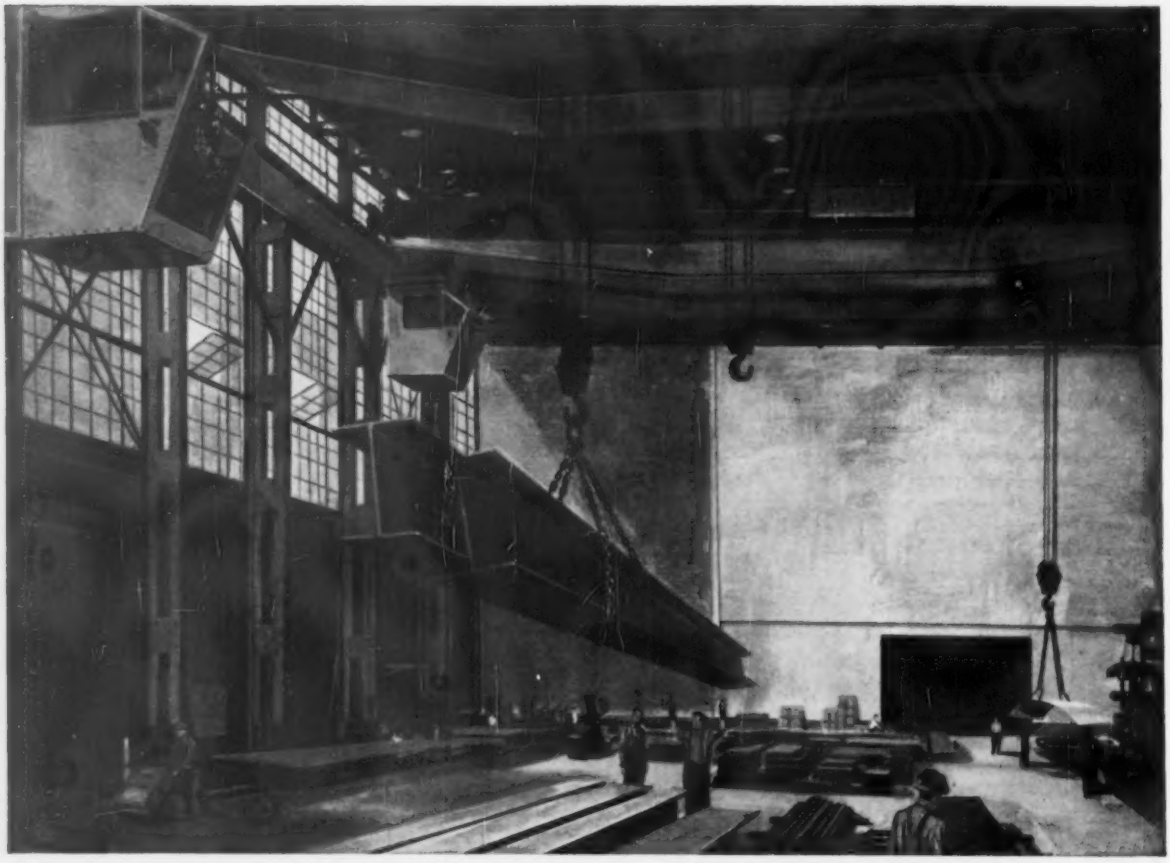
Eliminating field coating of pipeline couplings, a non-disbonding layer of 5-25 mils thickness is shielded by an outer layer of coal-tar enamel. Each permanently-coated coupling uses a special bonding device to insure cathodic protection against corrosion. Connecting pipe ends are simply "stabbed" into the ends of a coupling. Thus, the carefully-applied coatings aren't disturbed.



DOUBLE DUTY: Dual layers protect pipe.

Withstands 2550°F

Boron silicide, a new heat-resistent material, can be used at 2550°F in air for extended time periods. In powder form, this newcomer lends itself to fabrication by normal powder-metallurgy and ceramic methods. It's easily hot pressed to give very dense bodies. It can also be slip cast, oxide bonded or self bonded. When it's oxide bonded, it can be machined with carbide tools after pre-sintering in air at 2000°F.



TONS TO MOVE...SCHEDULES TO BEAT...BEARINGS MUST ROLL!

When the push is on, plant equipment must move at top speed. There's no time for machinery to act up, require excessive maintenance. That's why industry after industry relies on the bearing performance they've learned they can take for granted – Bower Roller Bearings for the heavy industrial machinery they make or operate. Bower-developed design advantages plus painstaking precision control reduce bearing failure and maintenance to an absolute minimum. What's more, the built-in durability of Bower bearings helps keep machinery operating at peak efficiency, even under the most rugged conditions. For *your* bearing requirements–for new equipment or for replacement – choose from Bower's complete line of tapered, cylindrical or journal roller bearings. Bower Roller Bearing Division, Detroit 14, Michigan.

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tapered
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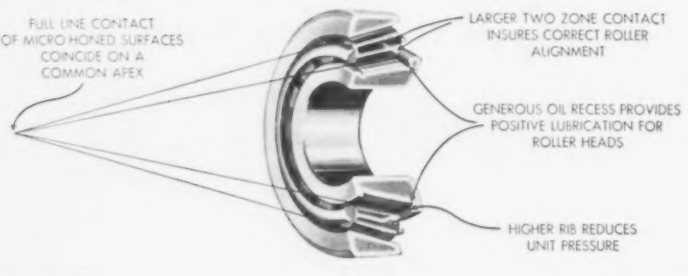
BEARINGS, INC.

IMPROVED DESIGN INSURES TOP ROLLER BEARING PERFORMANCE

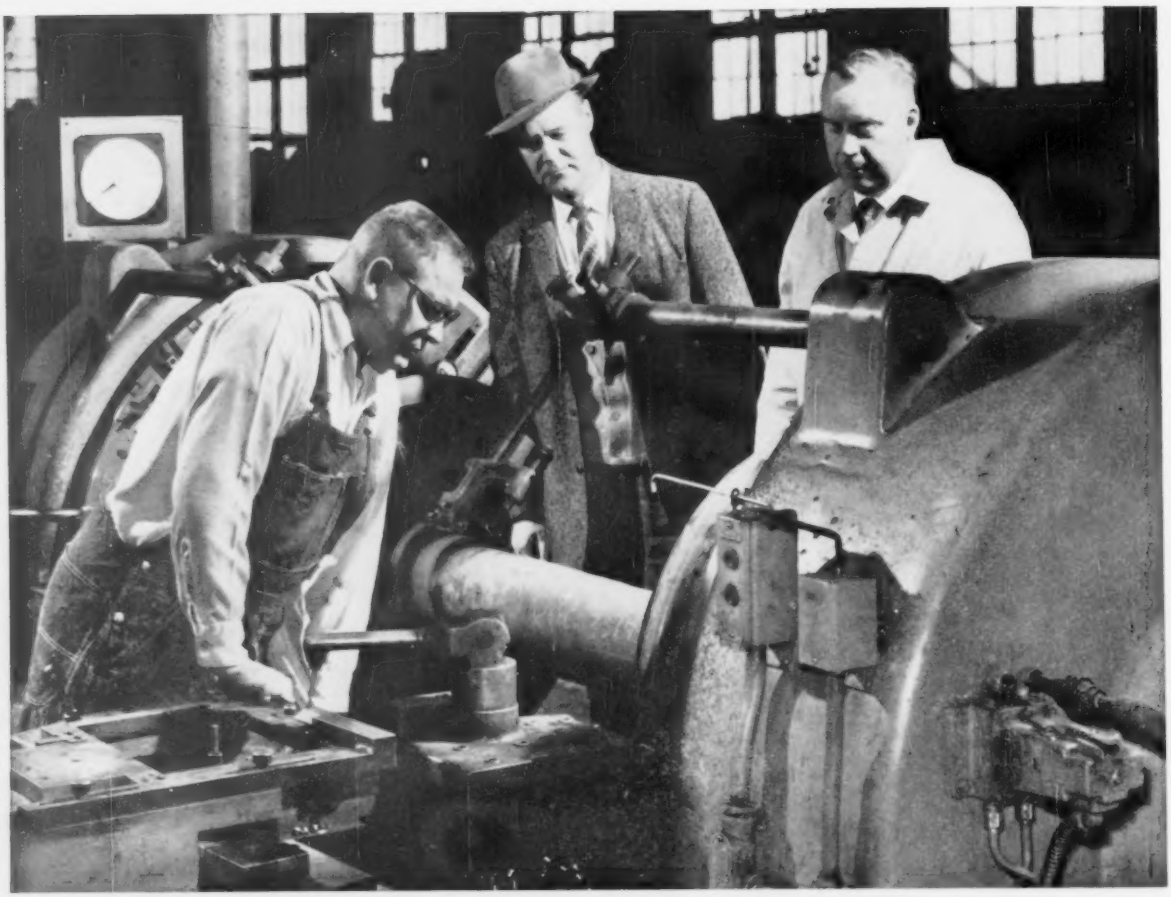

FULL LINE CONTACT OF MICRO HONED SURFACES COINCIDE ON A COMMON APEX
LARGER TWO ZONE CONTACT INSURES CORRECT ROLLER ALIGNMENT
GENEROUS OIL RECESS PROVIDES POSITIVE LUBRICATION FOR ROLLER HEADS
HIGHER RIB REDUCES UNIT PRESSURE

if she takes pride
in her home—

give her a kitchen
of stainless steel

McLOUTH STAINLESS STEEL—the spotless metal for homes and home products.

McLouth Steel Corporation
Detroit 17, Michigan



Machine Operator, Wheel Shop Foreman, Kennametal Carbide Engineer

3-man team solves operating problem

...by changing to KENDEX* "throw-away" inserts they reduced tool cost 68%

PROBLEM: How to reduce costs of profiling car wheels in a large railroad repair shop.

SOLUTION: They changed from conventional tooling to the new Kendex "throw-away" insert type tooling. These "turn-over" inserts provide eight cutting edges. When one edge dulls, the insert is quickly turned bringing a new cutting edge into the proper position without resetting the tool holder. When all edges are utilized the insert is replaced, thus eliminating costly regrinding.

RESULT: A carefully developed tool cost comparison by the user shows a saving of 68% for Kendex insert tooling.

That's the kind of service you can expect through your Kennametal carbide engineer. Thoroughly trained in carbide products, he devotes his time exclusively to the application of Kennametal hard carbides . . . and is well qualified to provide on-the-spot tool analyses and recommendations. Frequently, he can suggest tools of special design that can be developed through our headquarters engineering and manufacturing facilities to perform several machining operations simultaneously.

Depth of on-the-job experience—plus the continuing development of a variety of tungsten, titanium, and tantalum carbide grades—has led to the use of Kennametal compositions for tooling and wear-spot applications in practically every industry. Our product development group, working in cooperation with customers, keeps coming up with new types of tooling and new abrasion-resistant applications — engineered to meet specific requirements.

We believe you will be interested in our booklet, "There's Profit in Retiring a Tradition," which gives facts on how some companies have greatly reduced machining costs. Based on actual cases, it makes practical and profitable reading. Ask your Kennametal Carbide Engineer for a copy . . . or write direct to KENNAMETAL INC., Dept. IA, Latrobe, Pennsylvania.

*Trademark 33595

INDUSTRY AND KENNAMETAL ...Partners in Progress

Space Welding

■ The article in the April 6 issue of The IRON AGE entitled "Welding Meets Challenge of Space Age Metals" is bringing many requests for reprints. Among the comments concerning the article are the following.—Ed.

Sir—"We would like to compliment you on your very interesting article on welding and space age metals." — R. L. Sink, vice president, Astrotherm Corp., Indianapolis, Ind.; "I have just read the article with extreme interest."—R. C. Stanley, Aerojet-General Corp., Sacramento, Calif.; "I was sincerely interested in this article." — E. H. Wyche, Union Carbide Metals Co., Niagara Falls, N. Y.

Free Competition?

Sir—In the February 2 issue you had an editorial entitled "Double Standards: They Can Cause Anguish." Your paragraph toward the end of the editorial beginning "The question remains . . . ," expresses pretty well the popular reaction. Thinking along fundamental lines, however, since when are "Federal laws" always moral? How many people who now express righteous horror violated the Volstead Act, or violate the tariff laws, income tax laws, etc.?

Your idea of a "double standard" expresses the problem very concisely. As consumers, we all want cut-throat competition to give us lowest costs of living. As producers, we are all for controlled prices to give us maximum income. There are other variations of a double (or really multiple) standard in this area.

Really Want It?—Do we as a nation really want "free competition"? The anthracite industry of Pennsylvania is, or was, in free competition with oil and gas. Now that area is on the dole. There are many examples of companies of fairly substantial size finding out the merits of free competition both nationally and internationally.

Similar description could go on at great length. But is it not the basic problem that laws such as restraint of trade are out of date, inappropriate and based on too simple a philosophy for our present problems? Under such a situation, the appropriate section of the Justice Dept. desiring to make a showing hunts around for cases in which they feel they can gain publicity with the least chance of losing the case. Other cases that may be far more truly against the best interests of the country are ignored, particularly if they would be unpopular (or maybe even legal).

It seems to me, there should be a lot of soul searching by our citizens on what the country really needs. Why not spend our time and energy on considering: (1) What the conditions of business should be; (2) What are the better laws that might have some chance to produce such conditions? — J. R. Connelly, Palmerton, Pa.

Scrap Figures

Sir—We are studying the behavior of business cycles in Canada and the United States and would like to determine whether there is any statistical correlation with steel scrap composite prices. We have only the 1960 composite scrap prices and would appreciate it if you could let us have a table for previous years. We know you publish these figures weekly, but a figure for the first week in each month would be quite adequate for our purposes.—Eric J. Davis, Atlas Steel, Ltd., Ontario, Can.

■ Monthly steel scrap composite prices are published each year in The IRON AGE annual issue. A copy of the latest annual issue is being mailed.—Ed.

FOR
SUPER
$AVING$
ON
FASTENERS
Southern
HITS THE SPOT!

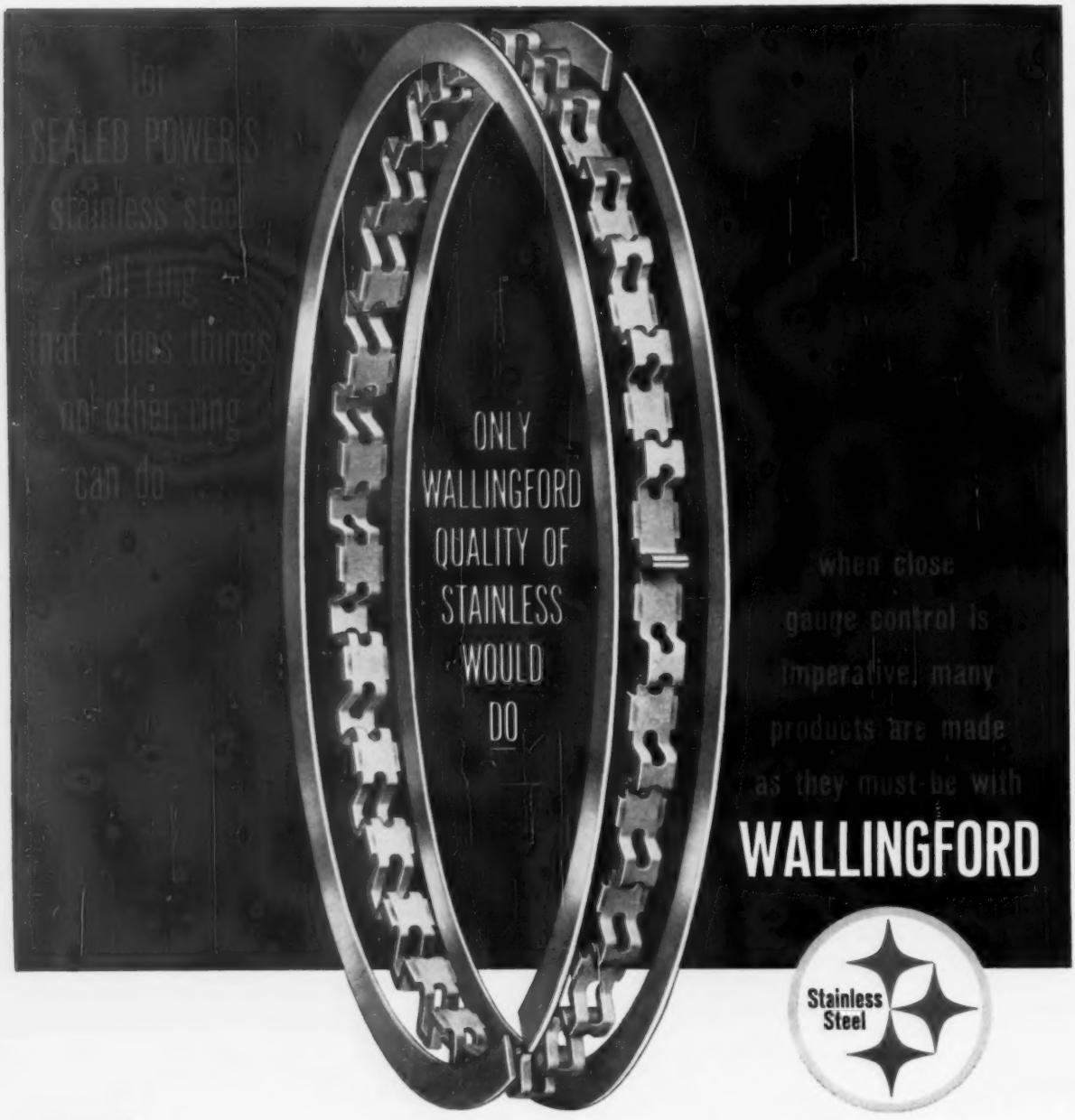
Today cost-conscious management men are taking a new hard look at quality fasteners as a partial solution to production problems. These men know that faulty fasteners often take a big toll in profits because of rejects, downtime, waste or spoilage. Likewise, they know that quality fasteners help insure more profitable operations through elimination of needless production hazards.

For super savings all along the line—standardize on USA-made Southern fasteners. Contact your Southern distributor, or write Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock
in Statesville, North Carolina

WAREHOUSES:
New York • Chicago • Dallas • Los Angeles

Machine Screws & Nuts • Tapping Screws • Stove Bolts • Drive Screws Carriage Bolts • Continuous Threaded Studs • Wood Screws



The "unprecedented acceptance" accorded Sealed Power Corporation's new stainless steel oil ring is largely attributable to the only stainless that met rigid specifications . . . WALLINGFORD!

Wallingford's close gauge control ensures more uniform distribution of the stresses in the functioning ring.

The clean-cut, burr-less edges of Wallingford strip-along with its total freedom from twist and camber—ensure the proper function of the punch press.

The as-rolled physical properties of the strip, and Wallingford's close control of them, contribute vitally to the production and ultimate function of the ring . . . and because Wallingford strip can be held to a precisely specified range of tensile, yield, and hardness, the ring is endowed with "a built-in tension that lasts indefinitely".

If you're a Wallingford customer, you're certain of such quality and performance, always. Exclusive Wallingford fabricating and testing techniques make it so. Ask for specific recommendations on your need for strip and tubing.

Progress in Metals Since 1922

THE WALLINGFORD STEEL CO.

TONNAGE *on a Laboratory Basis*

WALLINGFORD, CONNECTICUT, U.S.A.

Design for Precision

This issue, highlighting the up-to-date developments in metalworking design, comes about two weeks before the Design Engineering Show.

It's also a complete guide to the show, which will be held in Detroit's Cobo Hall from May 22 to May 25. You'll find (beginning on p. 124) a preview of the new products, materials, and equipment featured at the show. There's a list of the technical sessions on p. 167. And a rundown on all the exhibitors starts on p. 168.

Emphasize Perfection — We're most proud, however, of the special feature article, "How to Plan Production Runs With Precision in Mind," which begins on p. 105. It focuses attention on a problem that managers, designers, and production executives face: The trend to ultra-precision.

There's a growing demand to make objects more accurate, more clearly defined, sharper, more uniform, and closer to perfection. Tolerances are getting tighter and tighter.

But how do you plan for precision while in the product-design stage. This eight-page report, assembled and written by Associate Editor Bill Redstreake, points out that design engineers are equal to the task.

You'll find out why they are and how it's done by reading the article which begins on p. 105.

Back from the Far East

We are always interested in the house organs of major metalworking companies. But we saw one this week that really caught the attention of the staff.

It will have to be nameless, since none here can read Japanese. But it was the magazine of the Yawata Iron & Steel Co. in Japan.

Translation Needed — What caught our attention was a two-column picture of our editor-in-chief, Tom Campbell, plus a 12-page story. You recall, of course, Tom's series of on-the-spot reports made during his recent trip to Japan and other areas of the Far East.

The story was a transcript of an address and question and answer period with Tom before 60 of the leading officials of Japan's growing metalworking industry.

We asked Tom about it and he filled us in on some of the details.

Into the Night—His speech covered trends in U. S. steelmaking; market conditions now, in six months, and the long-term trend; world iron ore supplies; the world supply of coking coal; and the outlook for scrap. These are all vital questions that affect Japan's future industrial activity.

The regular speech lasted an hour and a half; the question and answer period about as long. Then, Tom heard later, the arguments among the audience lasted well into the night.

Trade Journal Time

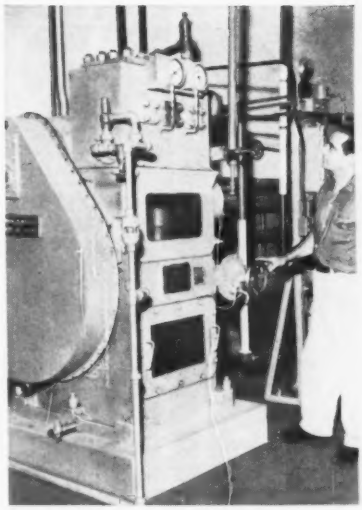
Naturally we're prejudiced in favor of trade publications. That's why we were intrigued by a pamphlet entitled "Why, When and How to Read Business Publications."

It's by Fred Wittner, president, Fred Wittner Co., New York advertising and public relations firm.

Mr. Wittner gives some sound reasons for reading trade publications. Through them, he says, a business man "obtains a master intelligence service and a continuing refresher course which cannot be had any other way."

How to Read Well—Later on, Mr. Wittner suggests some ways to read business publications effectively. We almost suspect he had IRON AGE in mind while making the suggestions. The elements he mentioned are those we try to concentrate on.

All in all, it's a booklet well worth reading. If you'd like a copy, write us and we'll see you receive one.



13 years...no downtime... no pressure deviation

For thirteen years, at RCA Victor Mexicana in Mexico City, this Aldrich-Groff Powr-Savr Pump has been delivering without a single unscheduled shutdown. Hydraulic presses are fed a water-oil emulsion at a steady 1800 psi. Pump provides stepless straight-line capacity control from zero to rated output. Pressure adjustment is automatic. Constant pressure has been maintained; any variation would have hiked reject rates. Accuracy and dependability of this calibre have enabled consistently high product quality, full production, maintenance of stringent delivery schedules.

You may need the un-ordinary performance an Aldrich-Groff variable stroke pump can give you. Write Aldrich Pump Company, 8 Pine Street, Allentown, Pa., for pump data or assistance in specifying—5 to 2500 hp, up to 50,000 psi. At any rating, Aldrich Pumps are tough because . . .

THE TOUGH PUMPING PROBLEMS GO TO

ALDRICH

THREE BILLION DOLLAR VOTE OF CONFIDENCE

in the future of OHIO

To keep pace with Ohio's dynamic growth, the state's eight investor-owned electric power companies will spend three billion dollars in the coming decade to double capacity. As much new generating capacity will be provided in the next ten years as was built in the past seventy-five.

If you are seeking a plant site, these facts are important for two reasons. First, this is solid indication of the confidence electric utilities have in Ohio's future growth. Second, you can be sure there will be plentiful, dependable electric power for your industry. Today, Ohio's generating capacity is 10.6 million kilowatts, and this state is the number one user of electric power in the nation.

Additional information detailing vital plant site factors is yours for the asking. Send the coupon below on your letterhead for two new booklets of solid facts: Statistical Abstract of Ohio: 1960 and Ohio, The Growth State.

Koder M. Collison, Director

State of Ohio, Department of Industrial and Economic Development

700 Bryden Road Columbus 15, Ohio

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COMING EXHIBITS

Design Engineering Show — May 22-25, Detroit Coliseum.

Tool Show—May 22-26, American Society of Tool and Manufacturing Engineers, New York Coliseum. (Society headquarters, 10700 Puritan, Detroit 38, Mich.)

Plastics Exposition—Ninth annual, June 5-9, New York Coliseum.

MEETINGS

MAY

Copper & Brass Research Assn.—Annual meeting, May 14-17, The Homestead, Hot Springs, Va. Assn. headquarters, 420 Lexington Ave., New York.

Steel Service Center Institute—Annual Meeting, May 14-17, Statler-Hilton Hotel, Washington, D. C. Institute headquarters, 540 Terminal Tower, Cleveland.

Machinery Dealers National Assn.—Annual Convention, May 15-18, Shoreham Hotel, Washington, D. C. Assn. headquarters, 1346 Connecticut Ave., N. W., Washington, D. C.

American Mining Congress — Coal convention & exposition, May 15-18, Cleveland. Congress headquarters, 1102 Ring Bldg., Washington.

RCA 501 Users Assn.—Study meeting, May 15-16, Palmer House, Chicago.

Building Research Institute—Spring conference, May 16-18, Shoreham Hotel, Washington. Institute headquarters, 2101 Constitution Ave., Washington 25.

Society for Non-Destructive Testing—Eastern regional convention, May 17-19, Mt. Royal Hotel, Montreal, P. Q., Canada. Society headquarters, 1109 Hinman St., Evanston, Ill.

Metallurgical Society of AIME—New England regional conference,

(Continued on P. 26)

As anyone can tell you, people (especially wife-type people) dislike being taken for granted.

Yet in a busy manufacturing plant, production schedules depend on the taken-for-granted reliability of all equipment (but especially materials handling equipment).

Whiting materials handling systems are the result of years of engineering improvements and refinements. A crane, like the one above, is thoughtfully engineered and carefully constructed so that its unobtrusive dependability can be taken for granted day in and year out.

Let us tell you about Whiting Cranes. Write: Whiting Corporation, 15601 Lathrop Ave., Harvey, Ill. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada. Ask for bulletin: "How to Select An Overhead Traveling Crane."

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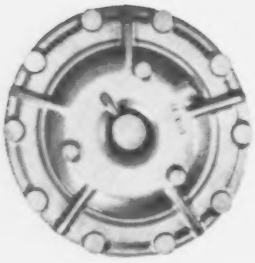
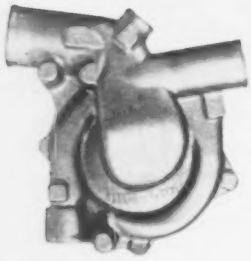
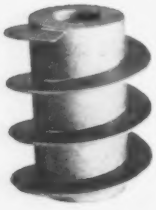
lower production costs with Decatur quality castings

Exhibiting at Design Engineering Show Detroit, May 22-25







In the highly competitive field of gray iron castings, buyers constantly seek greater reliability at lower cost. They lower costs by using castings which require minimum finishing and have the lowest rejection rate.

Decatur Quality Castings® have exceptionally smooth surface finish comparable to shell or permanent mold castings. When required, precisely controlled heat treating in our furnace gives these castings the uniform metallurgical properties necessary for high production machining. Preparation of unmachined areas is usually unnecessary.

Decatur castings are shipped to your plant in our trucks when quantities permit to insure prompt service.

We are light gray iron and alloyed iron specialists supplying castings weighing a few ounces to 100 pounds.

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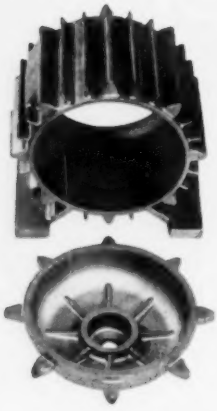

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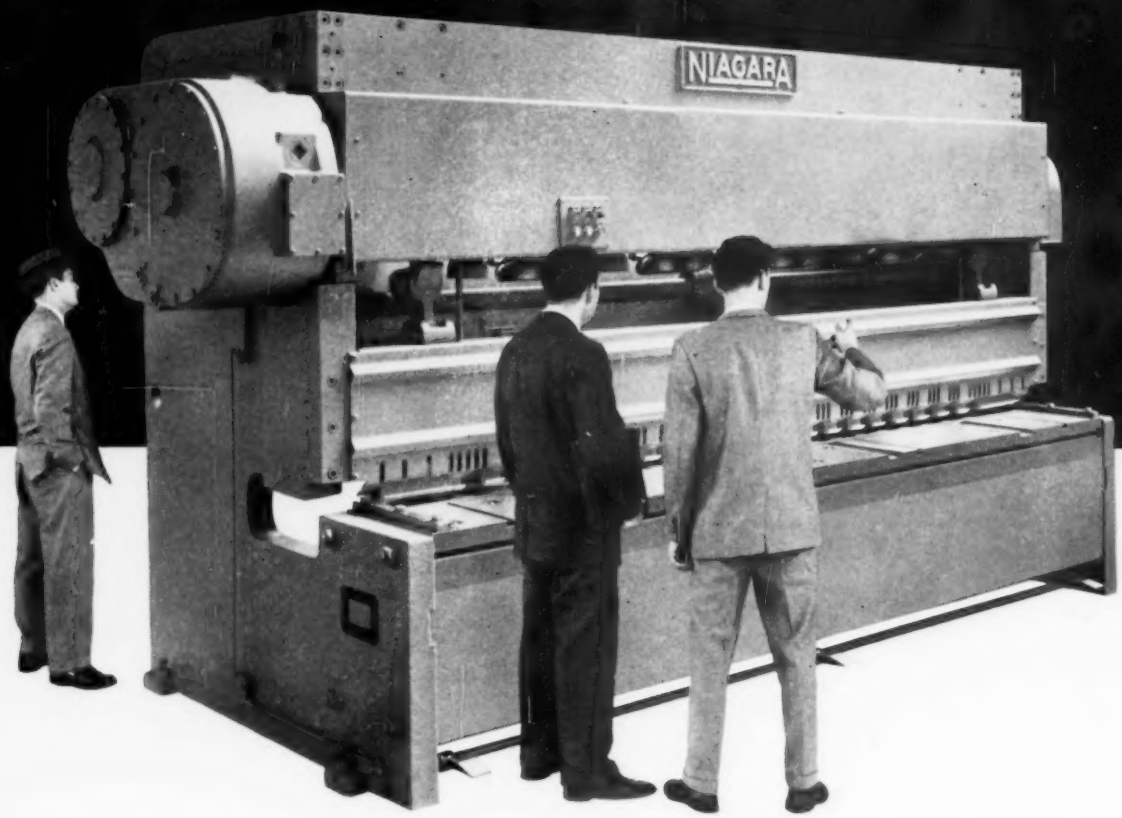

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MEETINGS

(Continued from P. 23)

May 18-19, Van Curler Hotel, Schenectady. Society headquarters, 29 W. 39th Street, N. Y.

Fluid Controls Institute, Inc.—Annual meeting, May 21-23, The Closter, Sea Island, Georgia. Institute headquarters, P. O. Box 667, Pompano Beach, Florida.

Industrial Heating Equipment Assn., Inc.—Spring meeting, May 21-24, Hot Springs, Va. Assn. headquarters, 2000 J St., N. W., Washington, D. C.

Magnesium Assn. — Annual meeting, May 21-24, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 122 E. 42nd St., New York.

ASTME Manufacturing Engineering Conference—May 22-26, New York Coliseum. American Society of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38.

American Iron & Steel Institute—General meeting, May 24-25, Waldorf-Astoria Hotel, New York. Institute headquarters, 150 E. 42nd St., New York 17, N. Y.

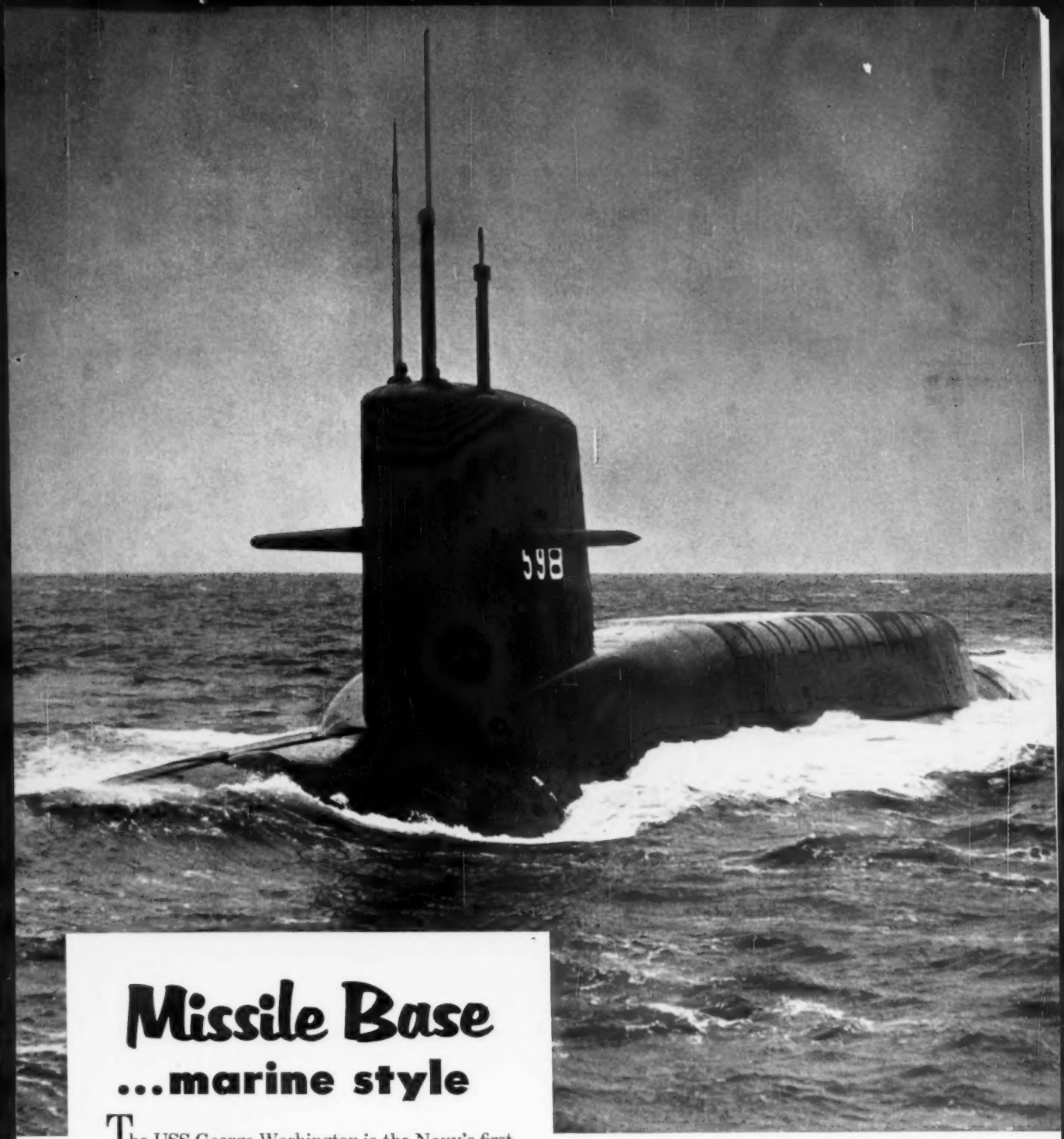
Electronic Industries Assn. — Annual convention, May 24-26, Pick-Congress Hotel, Chicago. Assn. headquarters, 1721 DeSales St., N. W., Washington, D. C.

JUNE

American Gear Manufacturers Assn.—Annual meeting, June 4-7, The Homestead, Hot Springs, Va. Assn. headquarters, 1 Thomas Circle, Washington.

Alloy Casting Institute — Annual meeting, June 18-20. Institute headquarters, 1001 Franklin Ave., Garden City, N. Y.

American Electroplaters' Society—48th Annual convention, June 18-23, Statler-Hilton Hotel, Boston. Society headquarters, 445 Broad St., Newark, N. J.



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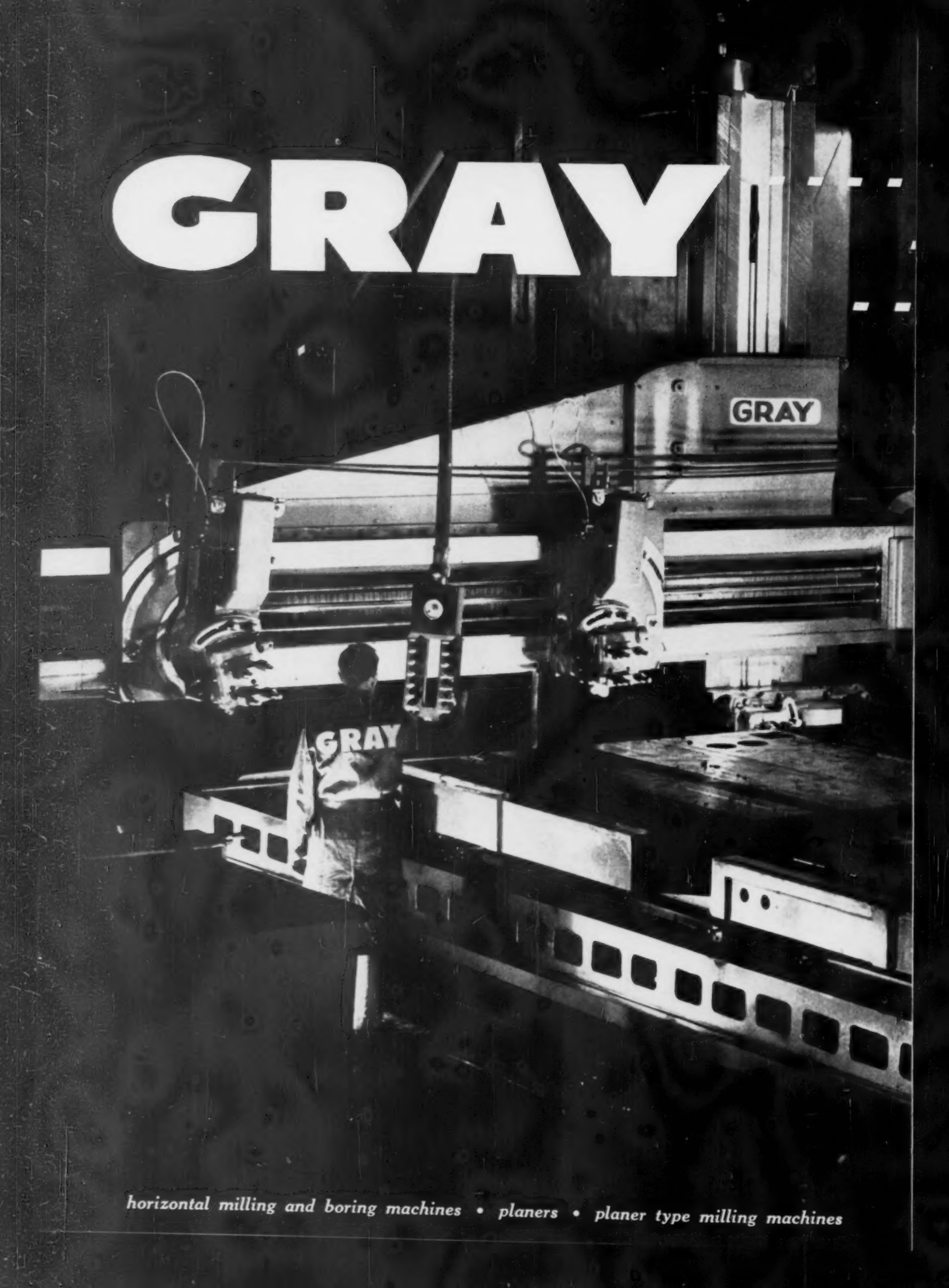

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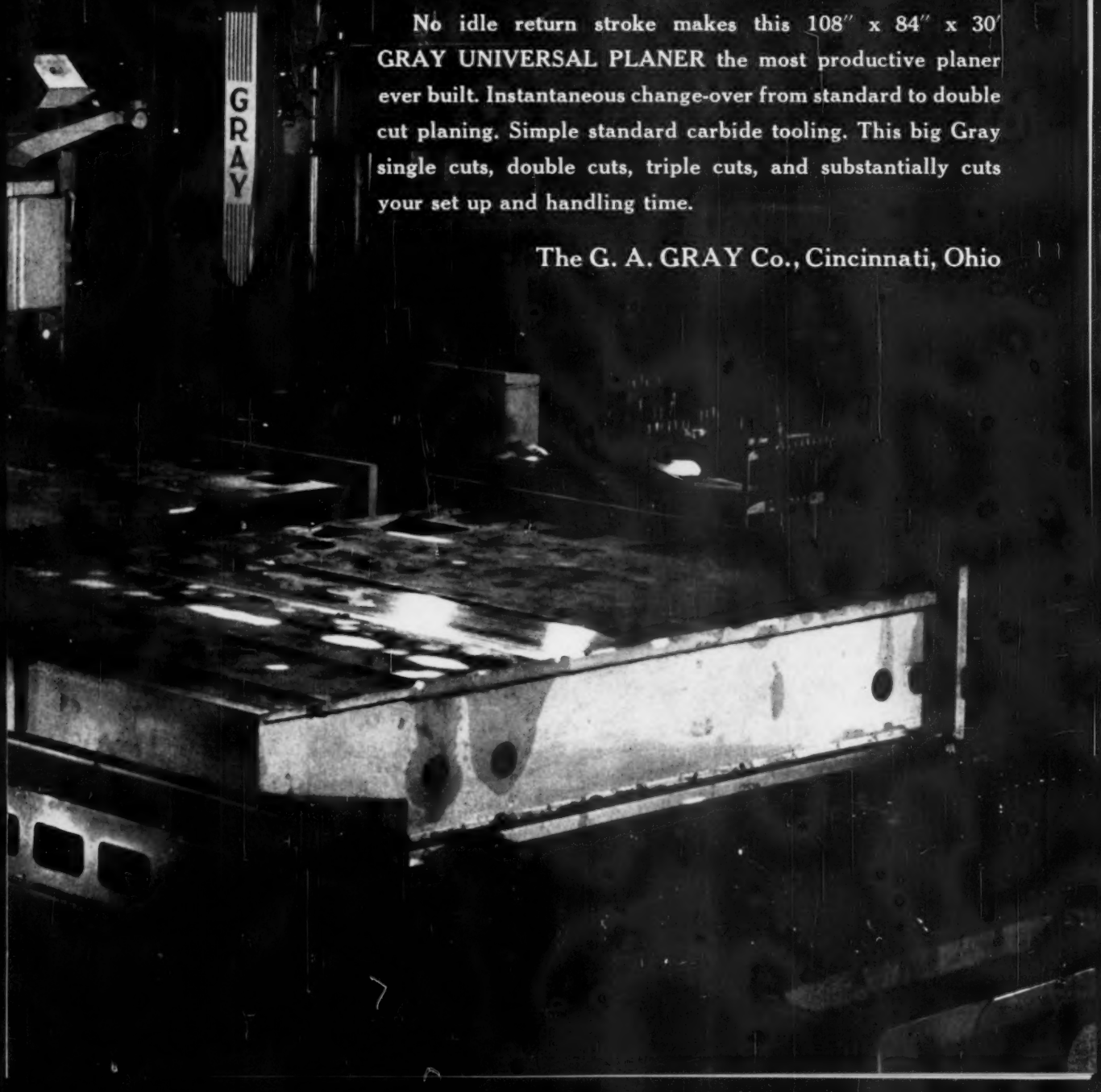

No idle return stroke makes this 108″ x 84″ x 30′ GRAY UNIVERSAL PLANER the most productive planer ever built. Instantaneous change-over from standard to double cut planing. Simple standard carbide tooling. This big Gray single cuts, double cuts, triple cuts, and substantially cuts your set up and handling time.

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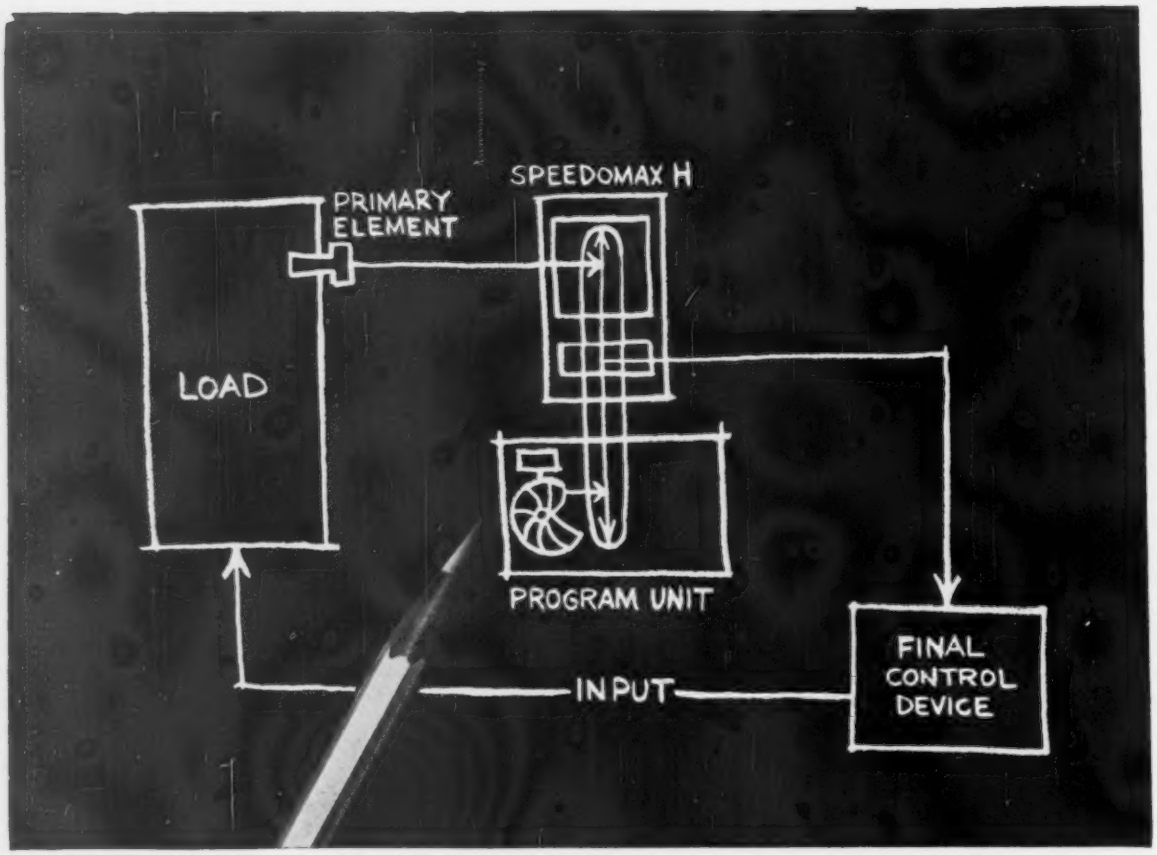


Reproduce your time-temperature cycles exactly with L&N cam-type program control

At the flip of a switch you can heat . . . soak . . . and cool at a preset rate for a preset time with L&N's improved cam type program control! Whether your program is linear or non-linear, this control will continuously regulate input to reproduce *your* cycle . . . again and again.

Heart of the system is the program unit. Essentially it's a motor-operated cam and a control slidewire. The cam is calibrated . . . making it extremely easy to lay out and cut to any time-temperature cycle. Changing a cam to meet a new program takes only a minute. For additional flexibility, the unit has seven standard speeds . . . permitting a multiple number of programs.

Other elements in the control system include a primary element, a Speedomax® recorder and associated control relay, and a final control device. Any change detected by the primary element and measured by the recorder is checked by the program unit, which regulates the final control device to keep the process on cycle.

Also available is a motor-operated front setter type of program control. Recommended for linear programs only, this system offers great flexibility within the range selected.

Both types are available for Two-Position or proportioning control . . . will regulate input to electric or fuel-fired furnaces.

Can your process benefit from programmed heating and cooling? If so, it'll pay you to investigate L&N program control. For more information, call your nearest L&N office, or write 4956 Stenton Ave., Philadelphia 44, Pa. Ask for Data Sheet ND46-33(4).

LEEDS Instruments LN NORTHRUP Automatic Controls • Furnaces

How's this for high-speed hobbing?

WORK PIECE					HOB (1 start)				Pieces per Load	Method*	Time per Piece	Pieces per Grind	Cut
Dia. Pitch	No. of Teeth	Helix Angle	Face Width	Material	Dia.	RPM	Feet PM	Feed					
10	20	15°	1¾"	1040 leaded	3"	500	395	.055"	1	A	2 min. 25 sec.	150	Finish
7	23	13°	¾"	8620	4"	350	370	.100"	2	A and B	59 sec.	240	Pre-shave
5	43	24°	1⅝"	8620	4"	280	300	.100"	2	B	3 min. 45 sec.	80	Pre-shave

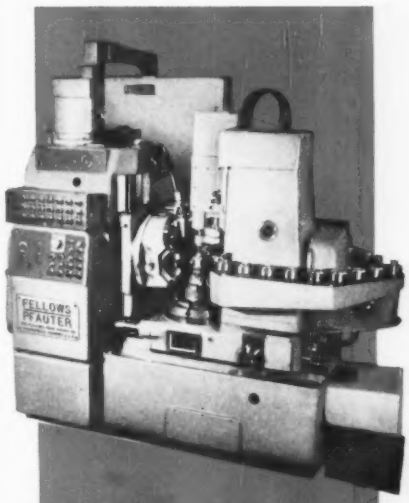
* *Method A: Diagonal Hobbing. Method B: Step-by-step Hobbing.*

The chart shows the cost-cutting, high-production performance you get with the Fellows-Pfauter P 400 High-Speed Hobbing Machine. And here are some advanced design features that make it possible:

It's Easy & Fast to Handle. Work area is easily accessible for setup and loading • Automatic retraction of table from hob facilitates work changes • Pushbutton hob shifting • Built-in hydraulics for operation of tailstock and fixtures • Provides infinitely variable speeds and feeds.

It's Rigid and Rugged for High Production. Heavy, rugged hob head • Double wall construction column and bed, with heavy V-ways • Table as large as maximum work piece diameter • Index worm gear nearly as large as work table • Work support column of massive construction.

Saves time, floor space and production costs. Get complete details on the Fellows-Pfauter P 400 High-Speed Hobbing Machine.



The Fellows-Pfauter P 400 High-Speed Hobbing Machine can be equipped with automatic loading and unloading devices to further increase its productivity.

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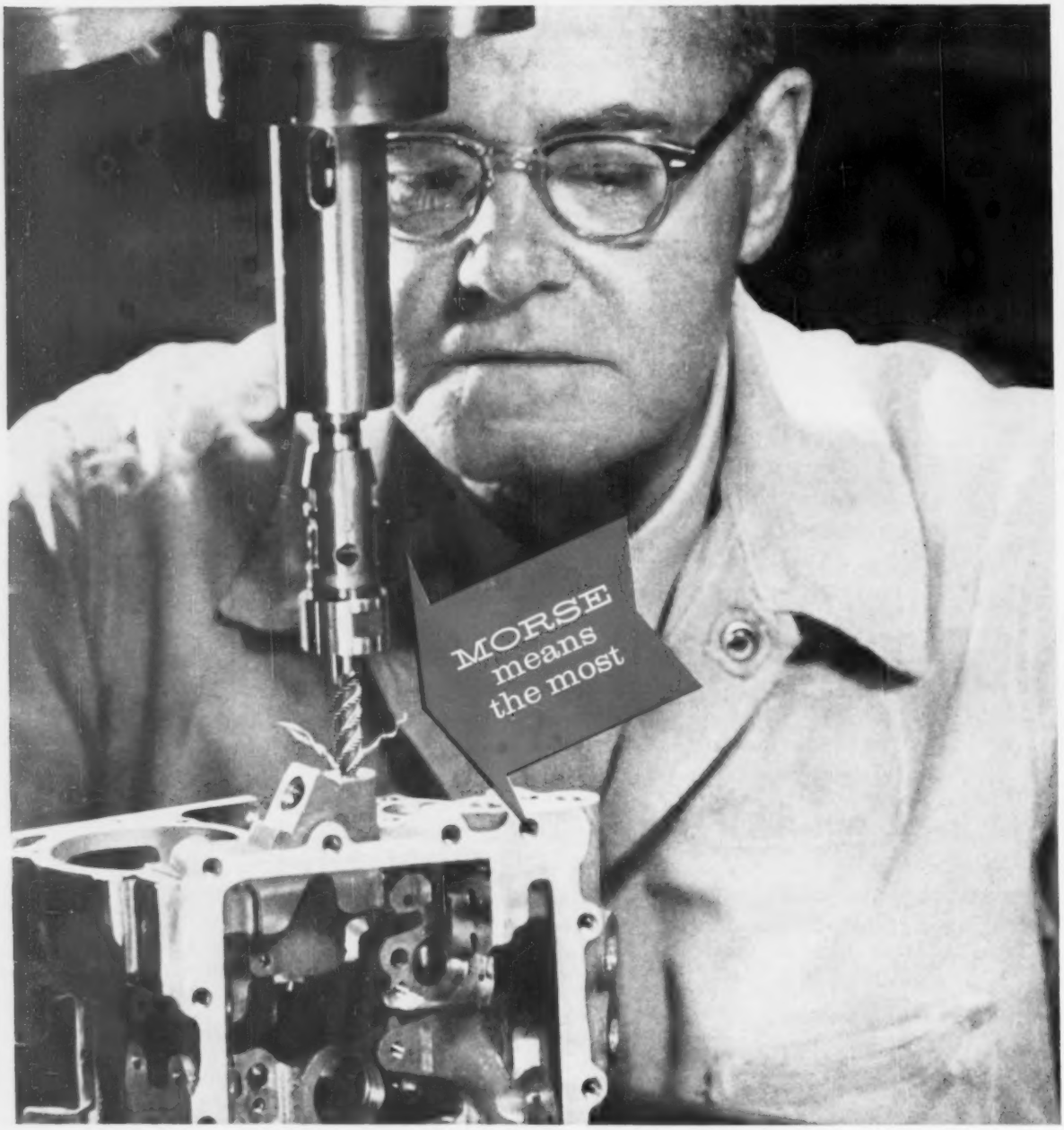

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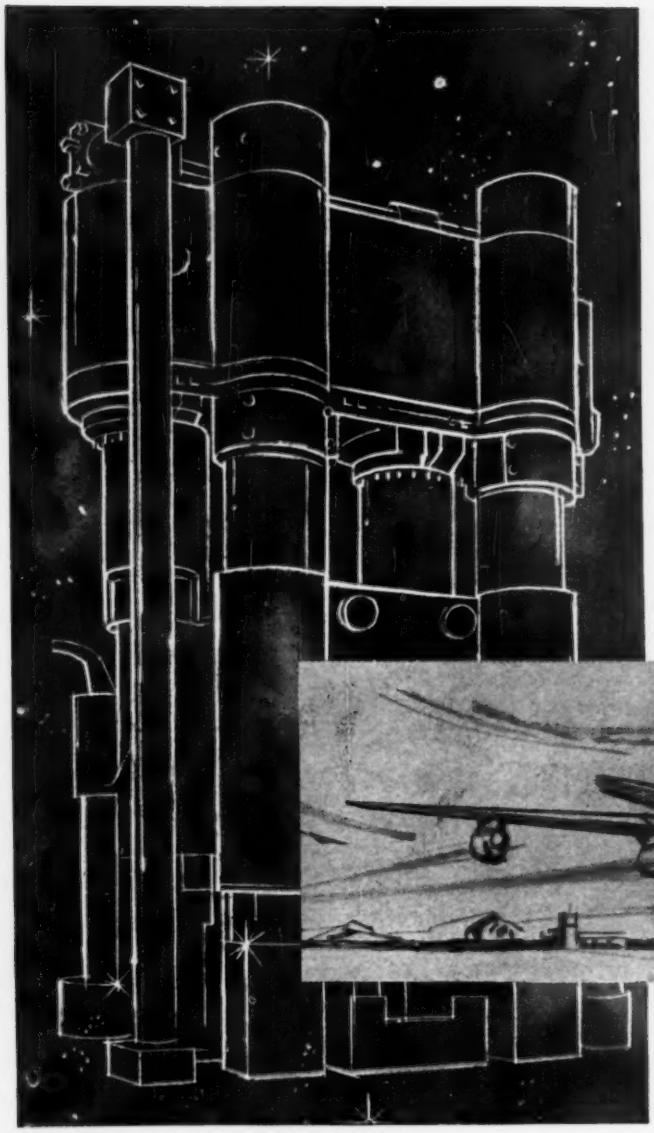
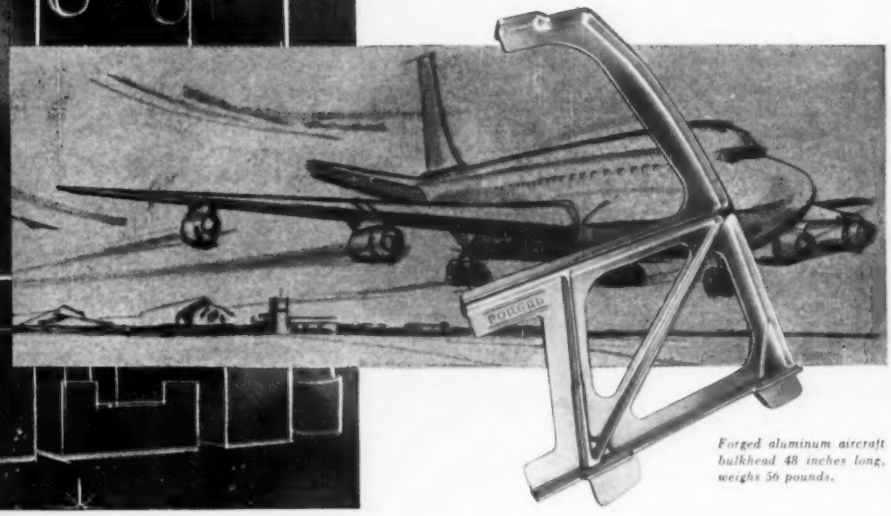


Modern hydraulic forging press exerts 35,000 tons pressure.

HOW FORGED PARTS help airplanes haul bigger payloads



Forged aluminum aircraft bulkhead 48 inches long, weighs 56 pounds.

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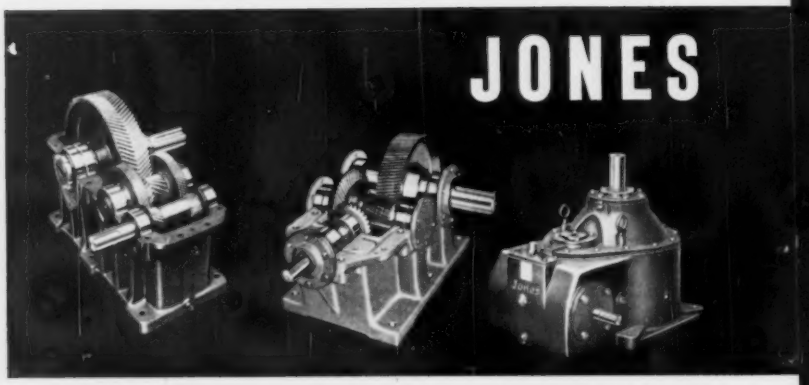

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Ruggedness and reliability, known throughout industry. Widest selection of sizes and ratios. Balanced design, rugged housing, heavy-duty bearings mean efficient, trouble-free operation, and longer life. Capacities to 1,672 hp. *Bulletin J-100.*

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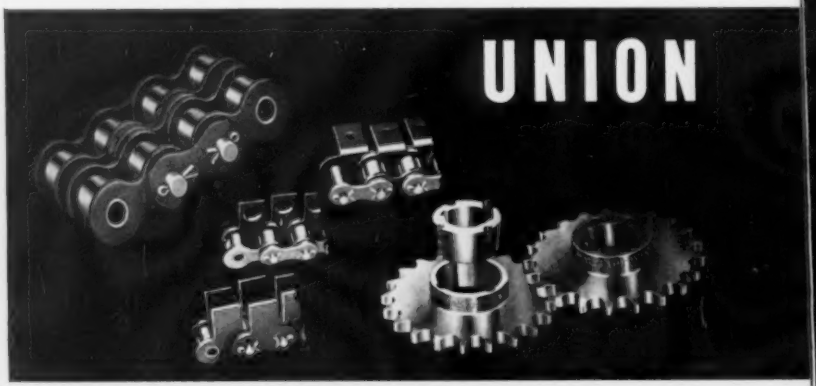

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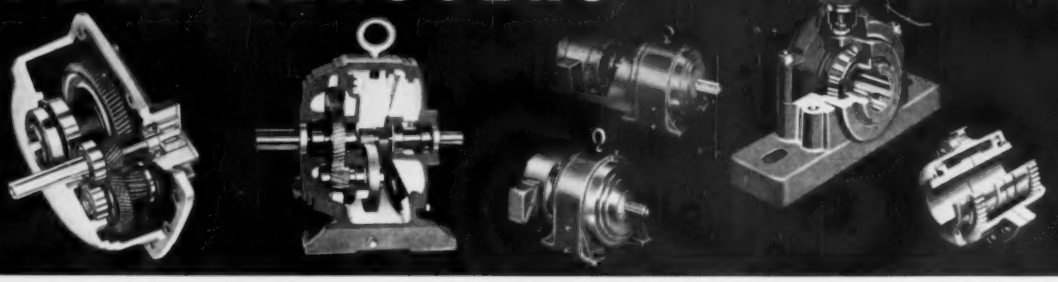

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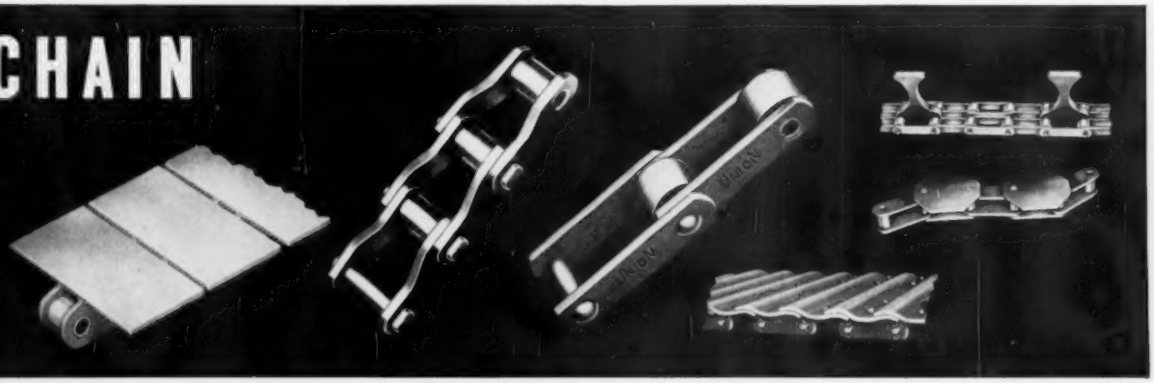
CHAIN



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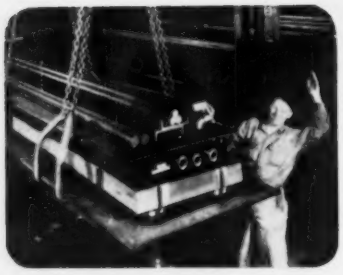
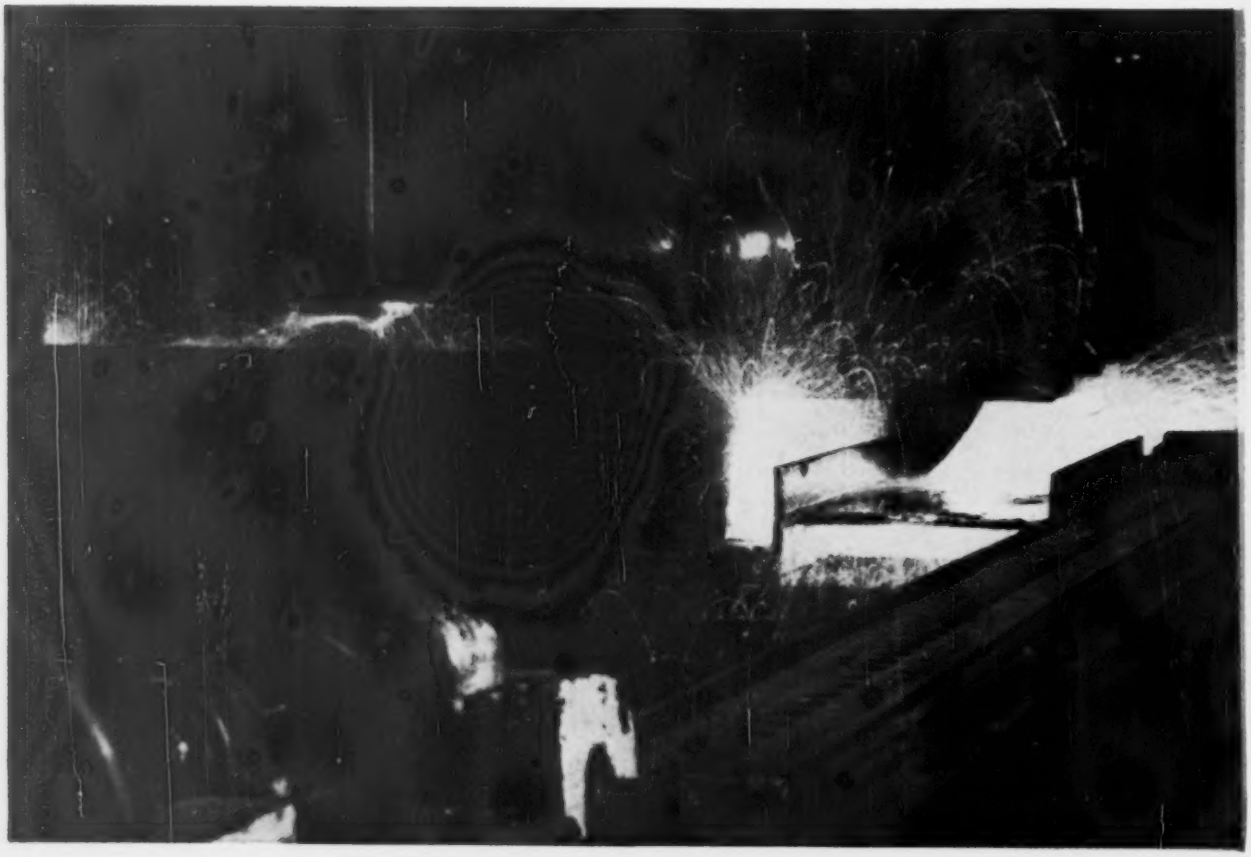


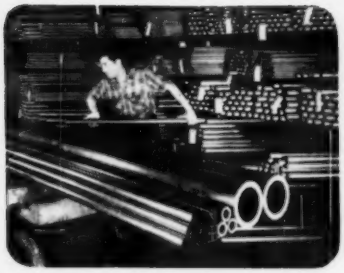
CARBON STEEL—No one even approaches the size and diversity of our stocks of hot rolled bars, plates, structurals. Published tolerances assure the industry's most exacting sawing, shearing and flame-cutting.

At Ryerson you will find the broadest selection of steel and aluminum in all types and sizes—plus plastics and machinery. Thus, you're assured of unbiased recommendations on material and metal-fabricating machines to speed production and reduce costs.

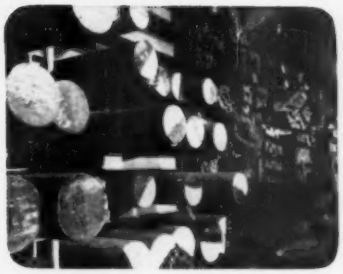
And backing up the size and diversity of stocks are these important services: certified quality controls; expert technical help; industry's closest cutting tolerances; dependable, on-time delivery.

Take a quick tour of Ryerson on these pages, then contact your Ryerson representative for details.

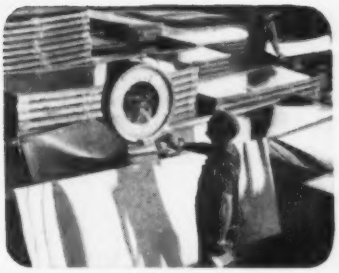




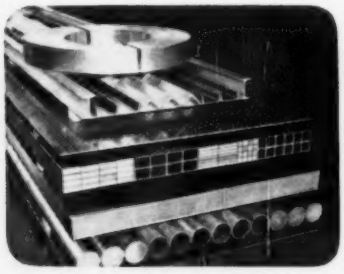
TUBING & CF BARS—Tubing: seamless and welded mechanical; structural; hydraulic cylinder & fluid line; Ledloy® 170. Bars: shafting, machinery steel, accuracy and screw stock, including fast-machining Ledloy 375 and 300.



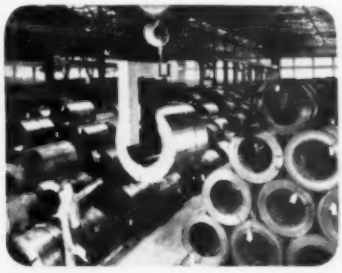
ALLOY STEEL—8-step certified quality program assures riskproof alloys—case-hardening, direct-hardening heat-treated alloys; leaded alloys, including fast-machining Rycut® steels; aircraft quality alloys; etc.



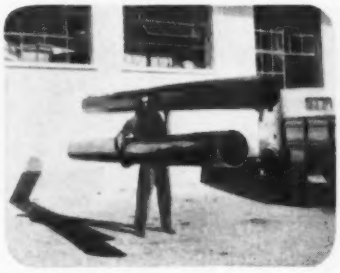
STAINLESS STEEL—2351 sizes, shapes, types and finishes in sheets, plates, bars, tubing, pipe and fittings, etc. All certified to meet ASTM, SAE, military, DuPont or GE specifications. Check in for fast stainless service.



ALUMINUM—Nation-wide service on Reynolds aluminum includes all mill products: sheets, plates, tubing and pipe; wire rod and bar; structural and extruded shapes; construction products for buildings and highways.

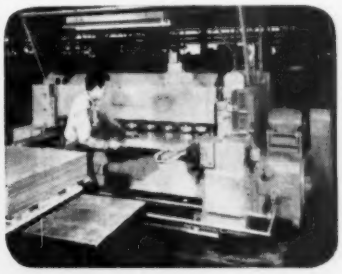


SHEET & STRIP—More than 20 kinds of stock sizes—or we can cut sheets to your order with latest shears, slitters and cut-to-length lines for faster service. Also strip coils, etc. Call us for all your sheet and strip requirements.



INDUSTRIAL PLASTICS—Ryertex-Omicron PVC pipe, tubing, sheet and rod conquer more than 281 corrosives. Also rigid Kralastic and flexible polyethylene pipe and Ryertex® laminated phenolic resin plastics.

This big friction saw bites through a 24" beam in less than 12 seconds. The accuracy of Ryerson cutting on all types of equipment is the closest in the industry.



MACHINERY—More than 3800 types and models of metal-fabricating equipment for bending, braking, drilling, forming, hoisting, pressing, punching, rolling, sawing, shearing, threading and welding.

BE METALOGICAL—All the plus values of our products and service add up to giving you "optimum value for every purchasing dollar. Whatever you need—steel, aluminum, plastics, machinery—be Metalogical, call Ryerson.

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

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DENISON HydrOILics

How **STEWART-WARNER** produces 220 different assemblies on one **DENISON** Multipress and saves...

MONEY

THIS NEW SERIES "R" MULTIPRESS *assembles 220 different assemblies and prepares them for brazing at Stewart-Warner Corp., Chicago. Write for free Bulletin 324—New "R-S-T" Series Multipress.*

COST-SAVING versatility was a key requirement on this pressing job. To produce assemblies for a new product line, Stewart-Warner's Alemite Division needed a press set-up that could handle up to 220 different assemblies. And because of the short runs involved, fast changeover with minimum downtime was a must. *Installation of just one Denison hydraulic Multipress filled the bill.*

This Denison Series "R" 6-ton bench press, equipped with automatic index table and special "quick-change" tooling, assembles from 600 to 850 assemblies per hour. Finished parts are uniform, high-quality . . . *no rejects.* And tooling changes can be made in minutes to accommodate the full range of 220 different types and sizes.

A unique feature of this operation is an adjustable applicator mounted on the index table that automatically applies a metered amount of brazing compound to each two-piece assembly. It completely eliminates a former hand operation—*and does the job better.*

What's *your* problem? Ask the nearby Denison Production Specialist about a **M**ultipress **A**nalysis **P**rogram in your plant now. It can **MAP** new ways to cut your costs, get better quality finished products.

DENISON ENGINEERING DIVISION
American Brake Shoe Company
1242 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS

Federal
BALL BEARINGS

One of America's largest ball bearing manufacturers

Precisely how precise can you get? Never too much so for Federal's standards. That's why even our master gages have gages to keep them "on the button". In this specially air-conditioned room, we calibrate our master inspection gages on a machine accurate to within 0.000010"! It's one way we insure dimensional accuracy in every Federal ball bearing — radial, angular contact, thrust, self-aligning or shafted. Single or double row. Open or sealed. There are hundreds of types, in all sizes. Send for our catalog today. The Federal Bearings Co., Inc., Poughkeepsie, New York.

Diamonds machine ceramic parts

Diamonds polish dies for plastic dinnerware

EACH OF THESE JOBS IS NOW DONE BETTER AND CHEAPER WITH DIAMONDS

Other abrasives and cutting tools were once used to perform every job shown here. But it was found, in every case, that diamonds do the work better, last longer, are more economical than the old way.

These pictures prove the versatility of diamonds, too. Look at the different *kinds*

Diamonds remove bumps from concrete runways and highways

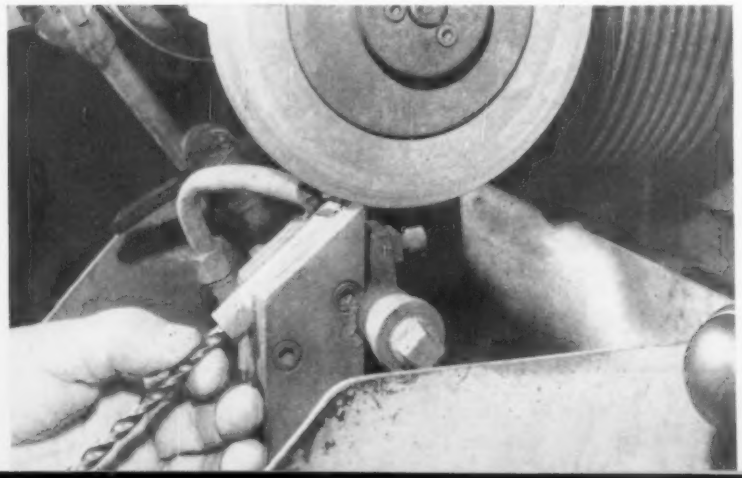
Diamonds edge automotive safety glass

of jobs they can do—everything from polishing the sensitively controlled dies that shape plastic dinnerware to shaving the bumps from a concrete jet runway.

If you cut, sharpen or smooth in your business, you can probably use diamonds to advantage. Next time you buy wheels or tools, ask for diamonds. Test them against the method you're now using. You'll find out how economical a diamond can be.

INDUSTRIAL DISTRIBUTORS (SALES), LTD., LONDON

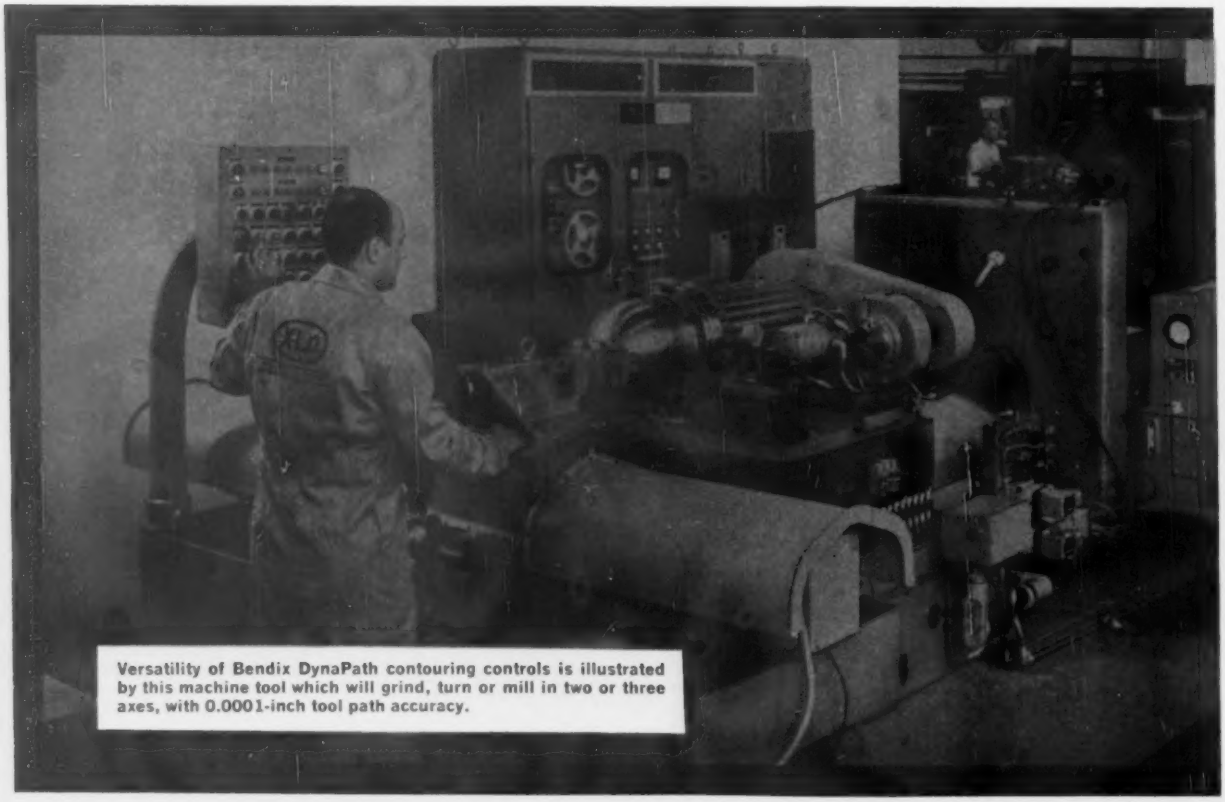
Diamonds grind chip-control splits in crankshaft drill



INDUSTRIAL DIAMONDS
CUT PRACTICALLY EVERYTHING . . .
ESPECIALLY YOUR PRODUCTION COSTS

BENDIX PROVIDES SYSTEMS EXPERIENCE TO MAKE NUMERICAL CONTROL WORK FOR YOU

Numerical control is a proved concept in metalworking. It has demonstrated its worth in scores of applications, but perhaps your manufacturing problems are different. Why not enlist the services of Bendix—long-time supplier of practical, reliable numerical control systems to most major machine tool builders. Let us be your prime source of information and assistance when the demand for increased productivity indicates a need for more modern equipment that will reduce scrap, reduce lead time, reduce inventory costs, and reduce tooling costs. Whether it's contouring, positioning or measuring, Bendix has the solution to your particular problem.



Versatility of Bendix DynaPath contouring controls is illustrated by this machine tool which will grind, turn or mill in two or three axes, with 0.0001-inch tool path accuracy.

YOU NEED BENDIX SYSTEMS EXPERIENCE when you consider numerical control for your application! Bendix offers:

1 JUSTIFICATION STUDIES—what can numerical control do for you?

2 SYSTEM ENGINEERING—applying the right control to the right machine tool.

3 TRAINING AND SERVICE—for maximum machine utilization rates.

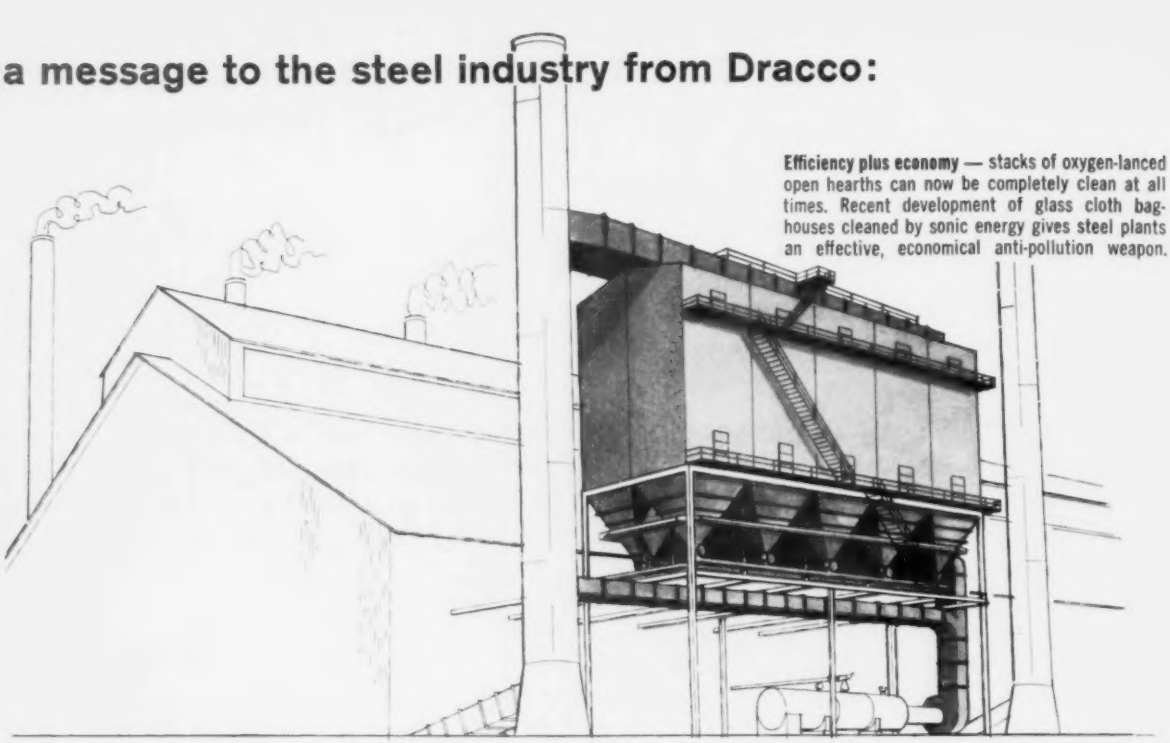
The unique Bendix Systems Experience is backed up by a staff of experienced electronic, mechanical and hydraulic engineers, mathematicians, instructors, technicians, and parts planners. Our contract machining and tape-making facilities offer years of accumulated case histories on all manner of applications *and* a chance to check out *your* problems in actual practice. Why not write today for more information on Bendix Systems Experience.

Industrial Controls Section
21820 Wyoming Ave., Detroit 37, Michigan

THE Bendix CORPORATION

Bendix
SYSTEMS EXPERIENCE
For tool room work, Bendix DynaPoint positioning systems can hold 0.0001-inch tolerances on this jig borer.
With Ferranti numerical control, this turret drill will do the work of several conventional machines, and reduce scrap.

a message to the steel industry from Dracco:



Efficiency plus economy — stacks of oxygen-lanced open hearths can now be completely clean at all times. Recent development of glass cloth baghouses cleaned by sonic energy gives steel plants an effective, economical anti-pollution weapon.

AIR POLLUTION CONTROL FOR OXYGEN-LANCED OPEN HEARTHS NOW COSTS LESS!

Dracco Glass-Bag Filters with patented sonic cleaning now offer the steel industry a practical solution to open hearth furnace gas cleaning. Under all operating conditions, they assure full-time, uniform high-efficiency collection at lower cost. Here are the facts:

• **Lower capital investment** can mean 33⅓ to 50% savings compared to less efficient, more costly devices currently used.

• **Lower maintenance costs**—including cost of infrequent bag replacements—can be realized. The reasons: (1) gas conditioning, with associated corrosion, is eliminated, (2) unskilled maintenance labor can be used, (3) no internal moving parts, (4) no acid mists deposited inside unit, (5) no elaborate seals or insulators, (6) no costly accessories—converters, transformers, controls, (7) long bag life —no severe flexing.

• **Extremely high efficiency** stays high at all times, regardless of fluctuations in dust and furnace conditions. Discharge free of visible solids can mean a clean stack for your plant.

• **Broad temperature operation** up to 600° F. is permissible with fiber glass bags. No cooling required when waste heat boiler is used.

• **Sonic cleaning — a must for open hearth dust and fume**—effectively removes accumulated particles from filter bags. Dracco offers patented apparatus insuring low back pressure and long bag life.

• **Built-in flexibility** counterbalances space requirements, permits use with any furnace, gas cooling method or materials handling system.

Rugged Dracco glass cloth baghouses can be custom engineered to give your plant clean stacks and better community relations. And you will be working with a firm having over 40 years experience in licking the toughest air pollution problems. For full details or expert consultation, contact: Dracco Division of Fuller Co., Harvard Avenue and East 116th St., Cleveland 5, Ohio.

DRACCO *airstream* conveyors
dust control equipment

FULLER COMPANY

- MACHINES UP TO 50% FASTER
- LENGTHENS TOOL LIFE

Uniloy 303MA is a free machining grade of chromium-nickel stainless steel developed by Universal-Cyclops. It has been proven greatly superior to AISI Type 303 in key plants throughout the country.

Production tests have proved that Uniloy 303MA machines up to 50% faster than Type 303. Cutting tools last longer, decreasing tool cost and machine down time. Completed parts have a better finish than is possible with Type 303, and the corrosion resistance is far superior.

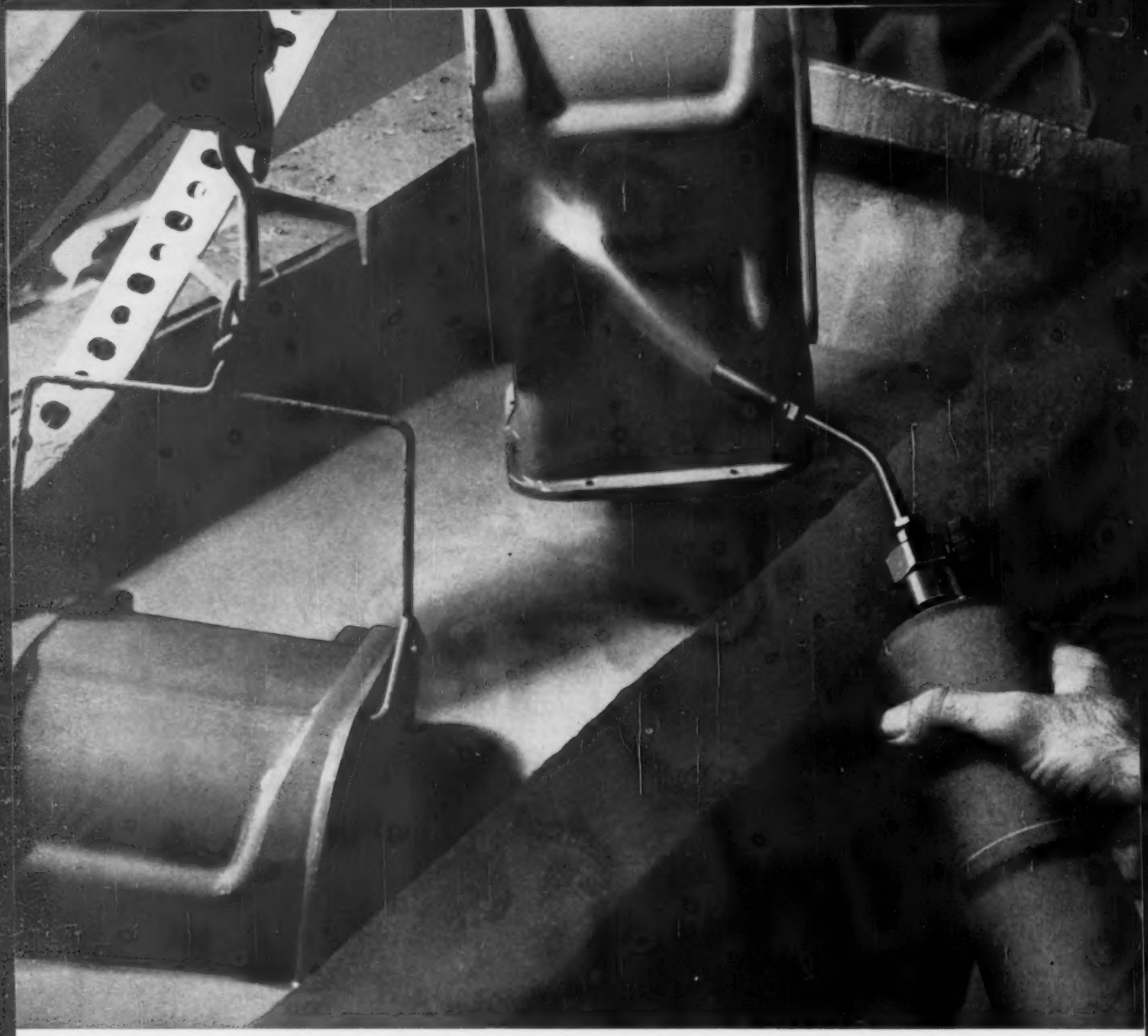
*Patent No. 2,900,250

Send for a copy of our new brochure containing complete data on Uniloy 303MA, and for Performance Reports citing dollar savings achieved by satisfied customers.

Contact your nearest Universal-Cyclops steel service center or sales office. Uniloy 303MA is AVAILABLE FOR IMMEDIATE DELIVERY.

UNIVERSAL CYCLOPS
UC STEEL
STEEL CORPORATION
EXECUTIVE OFFICES: BRIDGEVILLE, PA.

STAINLESS STEELS • TOOL STEELS • HIGH TEMPERATURE METALS



500 gallons of insurance against fire hazards

Because the "solvent" in this dip tank is plain old fireproof water, even a flame from a torch won't set the finish on fire. It's a Glidden water-reducible finish, containing no volatile solvents, no combustibles, no explosive fumes, no toxic or irritating chemicals.

Water-reducible finishes let you apply more paint in one application than with solvent systems. Costs are competitive with those of solvent-type finishes.

Glidden will help you switch to water-reducible finishes for your products. Ask your Glidden salesman for information on the complete line including new gloss finishes.

QUALITY Glidden PRODUCTS

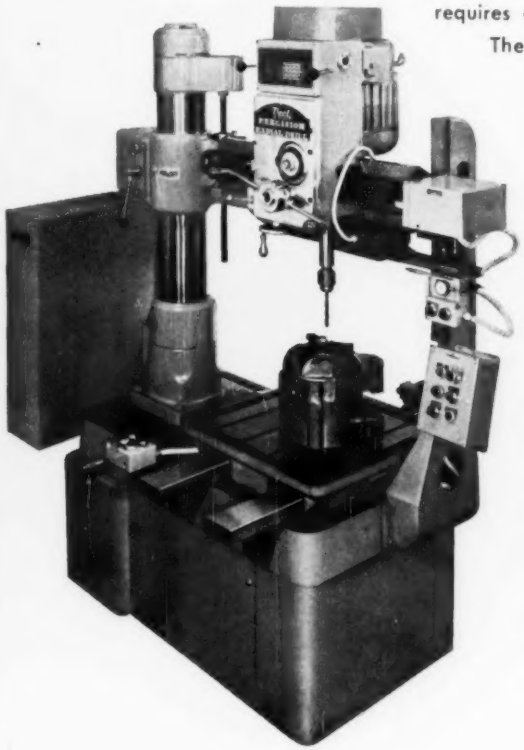
FINISHES FOR EVERY PRODUCT
The Glidden Company
INDUSTRIAL PAINT DIVISION
900 Union Commerce Building • Cleveland 14, Ohio
In Canada: The Glidden Company, Ltd., Toronto, Ontario

No matter what your product, process, or problem, Glidden finishes plus Glidden Technical Service can provide the answer.

SINGER*
NUMERICAL CONTROL

BUY THE COMPLETE PACKAGE...

FOR THE O.E.M. . . . SINGER Numerical Control . . . the most direct approach to point-to-point positioning . . . offers speed, capacity, versatility, a high degree of accuracy . . . and is available at a low initial investment. The system is sold as a package, complete and ready for installation, including the tape reader. It requires only the measuring bars to suit the specific machine. The SINGER system offers a high degree of accuracy, for drilling, jig boring or milling . . . ±.001 inches on a work table and up to 40 inches of travel.



...OR THE COMPONENTS

For the buyer who wants to acquaint himself with the advantages of automatic positioning, rather than buy a complete package, the SINGER system is ideal. Because of SINGER'S modular design, a machine can be furnished with the automatic positioning system only. At a later date, tape control can be readily added with no sacrifice of the original investment. It is important to know, too, that all modules and motors are designed, serviced and built by Diehl Manufacturing Company, a SINGER subsidiary. Call or write for an appointment at the address below.

Shown here is SINGER Numerical Control applied to the new Veetmatic Precision Drilling Machine. This electrically-operated system provides more economical operation at greater accuracies than conventional layout drilling procedures.

See SINGER Numerical Control applied to the new Veetmatic Drill at the A.S.T.M.E. Show in New York (Booth 2135), May 22-26, 1961.

Diehl†

DIEHL MANUFACTURING COMPANY

SUBSIDIARY OF THE SINGER MANUFACTURING COMPANY

Finderne Plant, Somerville, New Jersey

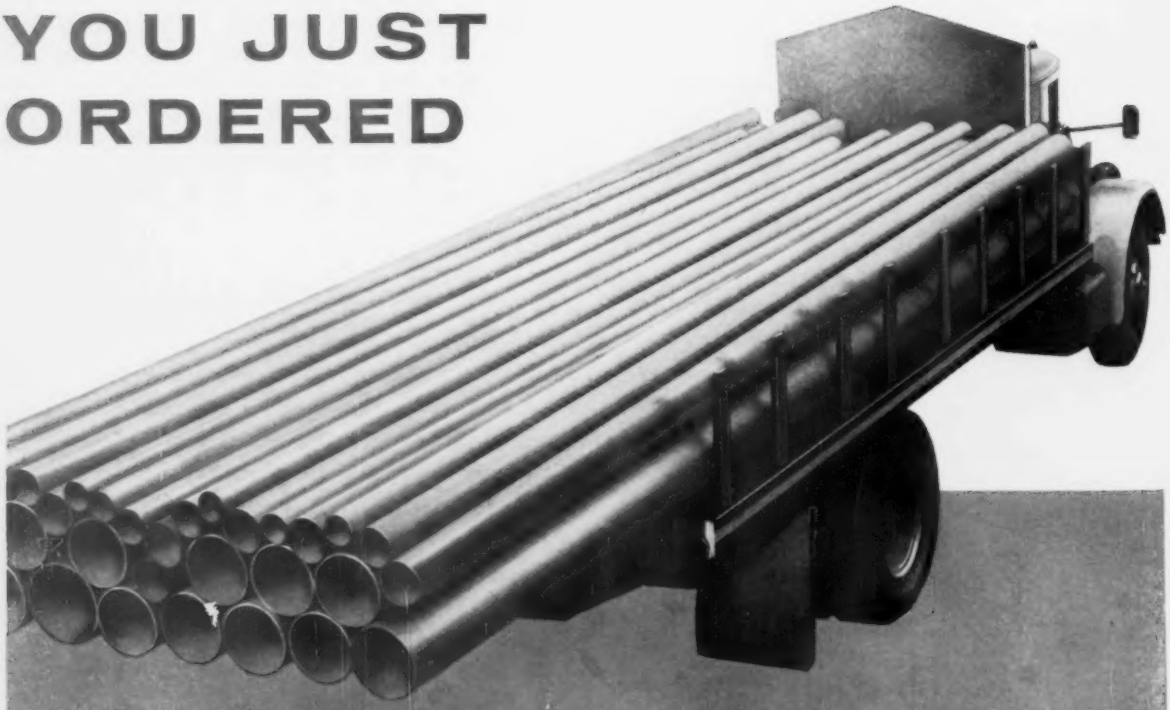
Telephone: Randolph 5-2200

*A Trademark of THE SINGER MANUFACTURING COMPANY

†A Trademark of THE DIEHL MANUFACTURING COMPANY

THE BEST WAY . . . THE SWEPCO WAY

THE PIPE YOU JUST ORDERED



LARGE DIAMETER STAINLESS STEEL PIPE —IMMEDIATE DELIVERY FROM SWEPCO DISTRIBUTORS

No more waiting — Your order is filled from warehouse stock.

SIZE RANGES:
2½" - 12" in Schedules 40 and 80 in 20' to 24' lengths
5" - 12" in Schedules 5 and 10 in 20' to 24' lengths

Available in all types of stainless steel and special metals and alloys to 30" OD in walls to 2" thick. Swepco distributors are ready to help you in selecting the exact and most economical grade of pipe for your particular application.
Call or write for full information.

Swepco
TUBE CORPORATION
One Clifton Boulevard • Clifton, New Jersey

Manufacturers of FFR Full Finished Rock-Forged Pipe and Tubing

STEEL SERVICE CENTER INSTITUTE

AUTHORIZED Swepco DISTRIBUTORS:

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Six hands on six buttons... safeguarded by Clark Anti-Repeat Press Controls... as used in the Cleveland Stamping Plant of the Ford Motor Company... one of more than 300 Clark-controlled presses in this modern plant.

How to make your presses most considerate of MEN, MACHINES and MONEY

It's just a little short of amazing what a difference the right press controls can make. Clark Press Controls, for instance, are designed to guard against every conceivable unsafe condition, while assuring maximum production.

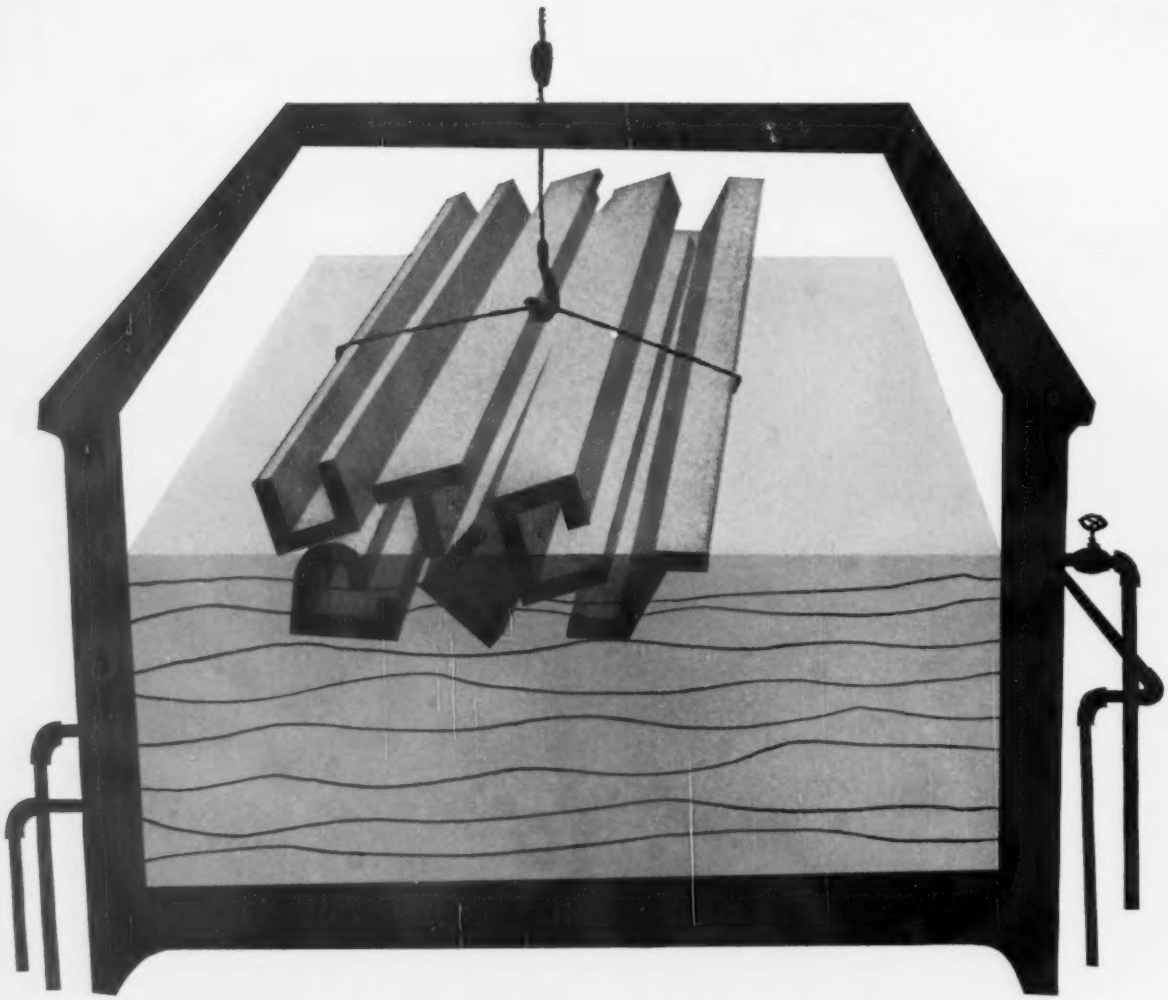
Benefits reported by our customers after standardizing on Clark Press Controls include:

- *Fewer accidents, resulting in lower industrial insurance rates.*
- *Greater protection against damage to expensive presses and dies.*
- *Substantial reduction in costly downtime.*

Today, there are more than 20,000 of our press controls in operation throughout industry. In automotive plants, Clark Press Controls outnumber those of all other manufacturers combined. Good reason to talk to Clark about *your* press control requirements... to call the nearest Clark sales office, or write: 61PC1

THE CLARK CONTROLLER COMPANY

MAIN PLANT: CLEVELAND, 10 • **WESTERN PLANT**: LOS ANGELES, 58
IN CANADA: CANADIAN CONTROLLERS, LIMITED, TORONTO, ONT.



Cut costs of aluminum finishing . . . with the Pennsalt System Approach

We can often save you money by treating your finishing line as an integrated system . . . because we supply both chemicals and the equipment in which they're used. Here's what we offer for aluminum finishing, for instance:

The materials. Inhibited and non-inhibited alkaline cleaners. Aldox® deoxidizing and desmutting agent for use both before and after etching. Aluminum etchants in solid, flake or liquid form. Albond* conversion coatings. Strippable vinyl coatings for protecting finished parts.

The machines. Automatic tank and spray washers. Immersion tanks for dip coating. Ovens and dryers. Strip joiners. All are custom-engineered to your production requirements.

Other "work-together" combinations from Pennsalt include over 40 types of metal cleaners, and tank and spray washers; pickling compounds, and automatic pickling machines; drawing lubricants, and automatic coating machines; Fosbond® phosphating agents, and automatic phosphating machines.

Personalized service. Specialists from our nationwide organization analyze your process, recommend the chemicals and equipment best suited for your needs, help with installation and start-up; then make periodic service calls to keep your line at peak efficiency. Write for a consultation and for our booklet, "The Pennsalt Metal Preparation Service Plan."

*Albond is a trademark of Pennsalt Chemicals Corp.

. . . a better start for your finish®

METAL PROCESSING DEPARTMENT
PENNSALT CHEMICALS CORPORATION
East: 3 Penn Center, Philadelphia 2, Pa.
West: 2700 S. Eastern Ave., Los Angeles 22, Calif.
Pennsalt Chemicals of Canada Ltd., Oakville, Ontario • Industrial Quimica Pennsalt, Mexico City

Pennsalt Chemicals
ESTABLISHED 1850

HOUGHTON MACHINING COOLANTS

A new advance in synthetic coolants

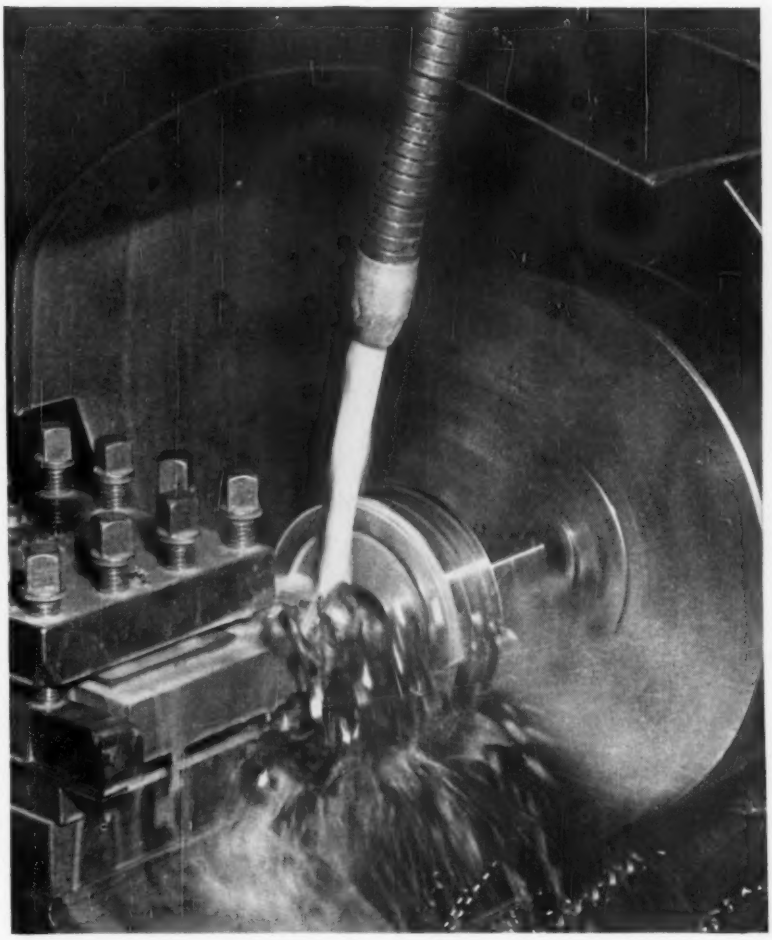
The first chemical coolants were outstanding in controlling rust and rancidity. They have done a good job and are widely accepted for many metal removal operations.

Because they were not heavy-duty fluids, our research department continued its search for a chemically-conceived coolant that could take the place of highly fortified straight oils. The result is new Hocut 3210—a significant advancement in the science of machining coolants.

Hocut 3210 is a highly fortified water-soluble concentrate. It has outstanding anti-weld and extreme pressure characteristics. As a result, it does better those jobs previously reserved for fortified straight oils. Hocut 3210 improves finish at higher speeds without sacrificing tool life. Additionally, it eliminates smoke, oil fog and inherent fire hazards.

Hocut 3210's E.P. characteristics are released by the heat of the cutting operation. This forms a barrier between the tool and the work resulting in a clean cut, free from any welding of chip to tool. Tool life is increased, surface finish improved and parts come off the machine cool enough to handle.

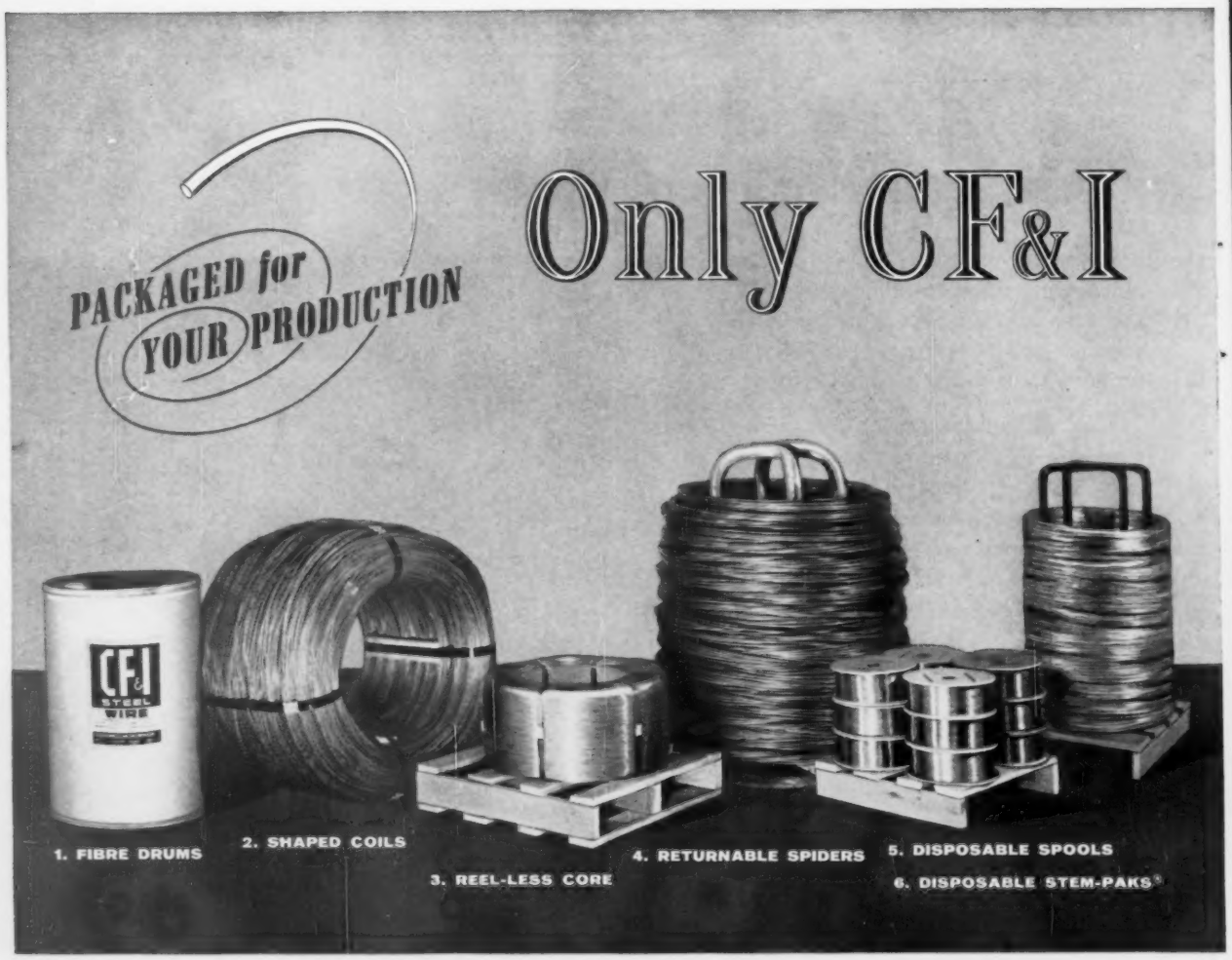
Its heavy duty ability makes it an ideal coolant for tough jobs such as tapping, broaching, form grinding, internal and external thread cutting, thread rolling, plunge grinding, etc.



In spite of all the outstanding features and capabilities of Hocut 3210, its cost is most reasonable. To be up to date on this latest coolant advance, write for complete data or ask your nearby Houghton Man for a test in one of your tough jobs. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION



Of all steel-wire manufacturers, *only* CF&I offers you high quality steel wire in all the packages shown above. These packages are designed to help you cut downtime . . . ease storage and handling problems . . . and increase daily production.

1. FIBRE DRUMS – 250-600 lbs. capacity. A sturdy container, with a center core, which holds wire of one continuous length. A metal cover and locking band seal the drum and protect the wire from atmosphere and dirt. Wire is withdrawn directly from the drum into your equipment. Two sizes: full and half drum.

2. SHAPED COILS – 1500-2500 lbs. capacity. This heavy coil contains wire of one continuous length, bundled with four steel straps. Will increase production up to 25%.

3. REEL-LESS CORE – 800-1000 lbs. capacity. Reduces shipping expense by eliminating deposit on reels and cost of returning empty metal reels. One continuous length is wound on a cardboard core. When received at your plant, the wire is placed on your aluminum, detachable-flange reel . . . ready for use.

4. RETURNABLE SPIDERS – 2000-3000 lbs. capacity. A sturdy wire carrier consisting of a center core of 2″ steel pipes welded to a heavy base plate. Holds one continuous length of wire, reduces downtime and increases production.

5. DISPOSABLE SPOOLS – 5-70 lbs. capacity. Can be used once and then discarded. Has the advantage of wire on spools with no deposit, no return of empty spools.

6. DISPOSABLE STEM-PAKS® – 500-1000 lbs. capacity. One continuous length of wire on a disposable pallet consisting of a center core attached to a wooden base mounted on 4″ runners. Speeds unloading, handling and increases production.

7. RETURNABLE STEEL REELS – 500-800 lbs. capacity. Holds one continuous length of wire, ready for smooth, even pay-off. Assures you wire free from damage in transit. Because reels require

offers you all ten!

less pay-off space, valuable production area can be saved.

8. WOODEN RACKS – 1500-3000 lbs. capacity. Protects coils during shipping and simplifies in-plant handling. Eliminates need for handling individual coils.

9. SPOOL-LESS BLACK-SATIN PAKS – 2000 lbs. capacity. Provides two 1000 lb. continuous lengths of oil tempered wire wound on cardboard cores, palletized and shrouded with polyethylene. Ideal for long production runs. Cuts downtime up to 90%.

10. STANDARD COILS—100-600 lbs. capacity. Packaged for a wide range of industrial uses. They are securely bundled and can be paper-wrapped for protection in transit and storage.

• • •

For more complete information on each of these ten wire packages, we invite you to consult your CF&I sales office. 6119

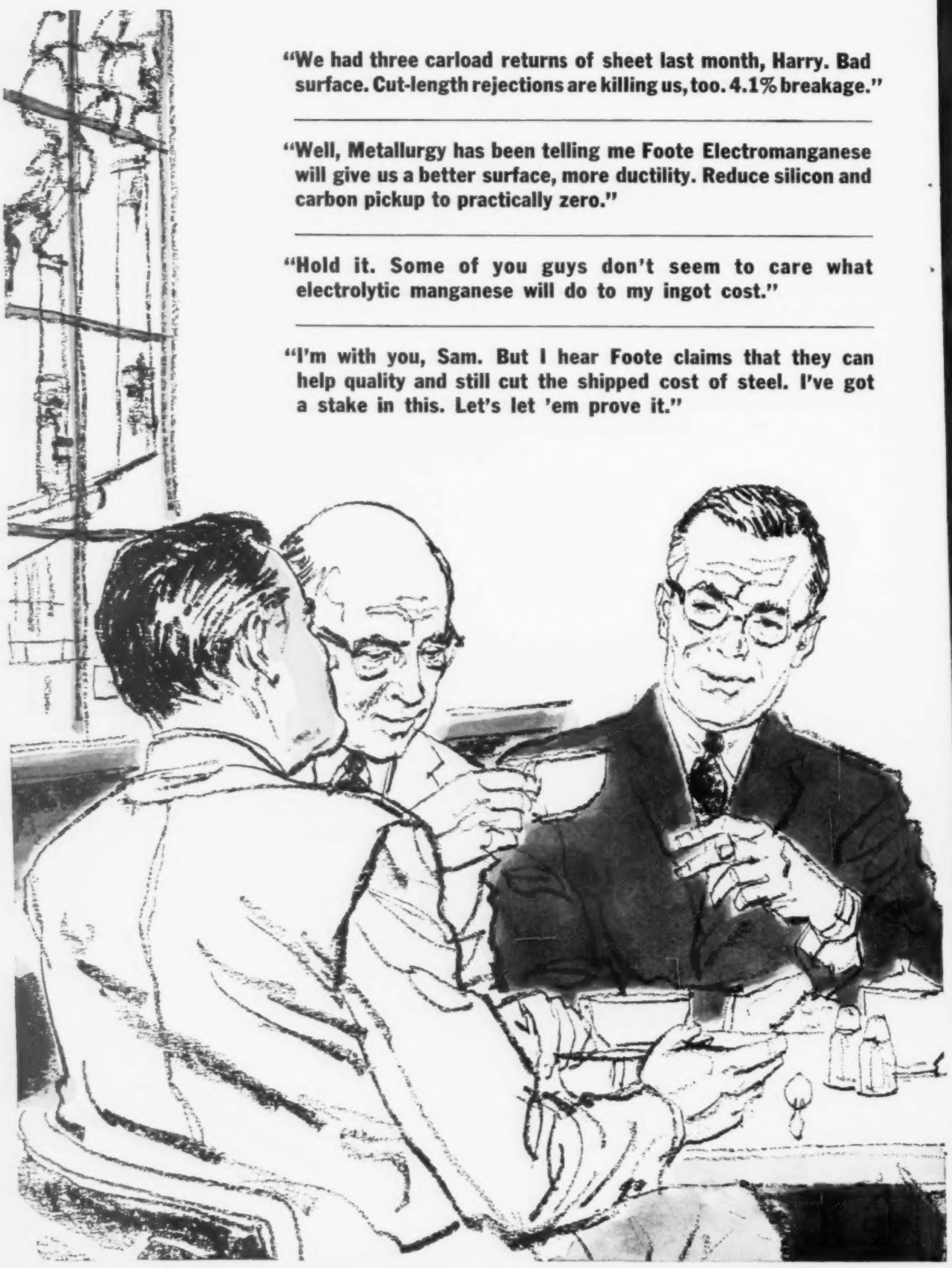
THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in All Key Cities

"We had three carload returns of sheet last month, Harry. Bad surface. Cut-length rejections are killing us, too. 4.1% breakage."

"Well, Metallurgy has been telling me Foote Electromanganese will give us a better surface, more ductility. Reduce silicon and carbon pickup to practically zero."

"Hold it. Some of you guys don't seem to care what electrolytic manganese will do to my ingot cost."

"I'm with you, Sam. But I hear Foote claims that they can help quality and still cut the shipped cost of steel. I've got a stake in this. Let's let 'em prove it."



We'd be glad to! . . . We'll show you how Foote Electromanganese® can help control the cost of steel from pouring platform to loading platform. Yes, the cost of ingot may go up. But after this initial investment in quality, costs tumble. Electromanganese increases ductility. Rolling properties are improved, annealing cycle can be shortened. The secret is a simple one. Foote Electromanganese is pure manganese—99.9% pure. Carbon, phosphorus, silicon are almost not there at all. You make cleaner steels. Reject rate drops—so you sell more of what you make. And when your steel is shipped, returns are way down, breakage claims way down. Steels made with Electromanganese lead from strength, give you a better break on profits.

We will also make available to you a Foote expert—free. He'll assist in every way possible. Get in touch with your Foote representative—today, and write for your copy of Bulletin 201 which describes all the benefits in using Electromanganese. Foote Mineral Company, 438-18 West Chelten Avenue, Philadelphia 44, Pennsylvania.

FOOTE
MINERAL COMPANY

450* PIECES PER MINUTE!

NOT JUST SPEED ALONE ... BUT SPEED PLUS ...

accuracy of product, rigidity, good tool life, fewer and simple adjustments, lower maintenance!

Have you witnessed production runs of difficult-to-make parts on National High Speed Headers? Observe the many features in machine and tooling. Start now to gain the benefits of sustained production at the highest safe speeds ever achieved!

We welcome you to Tiffin for actual demonstrations and a thorough study of your cold heading requirements.

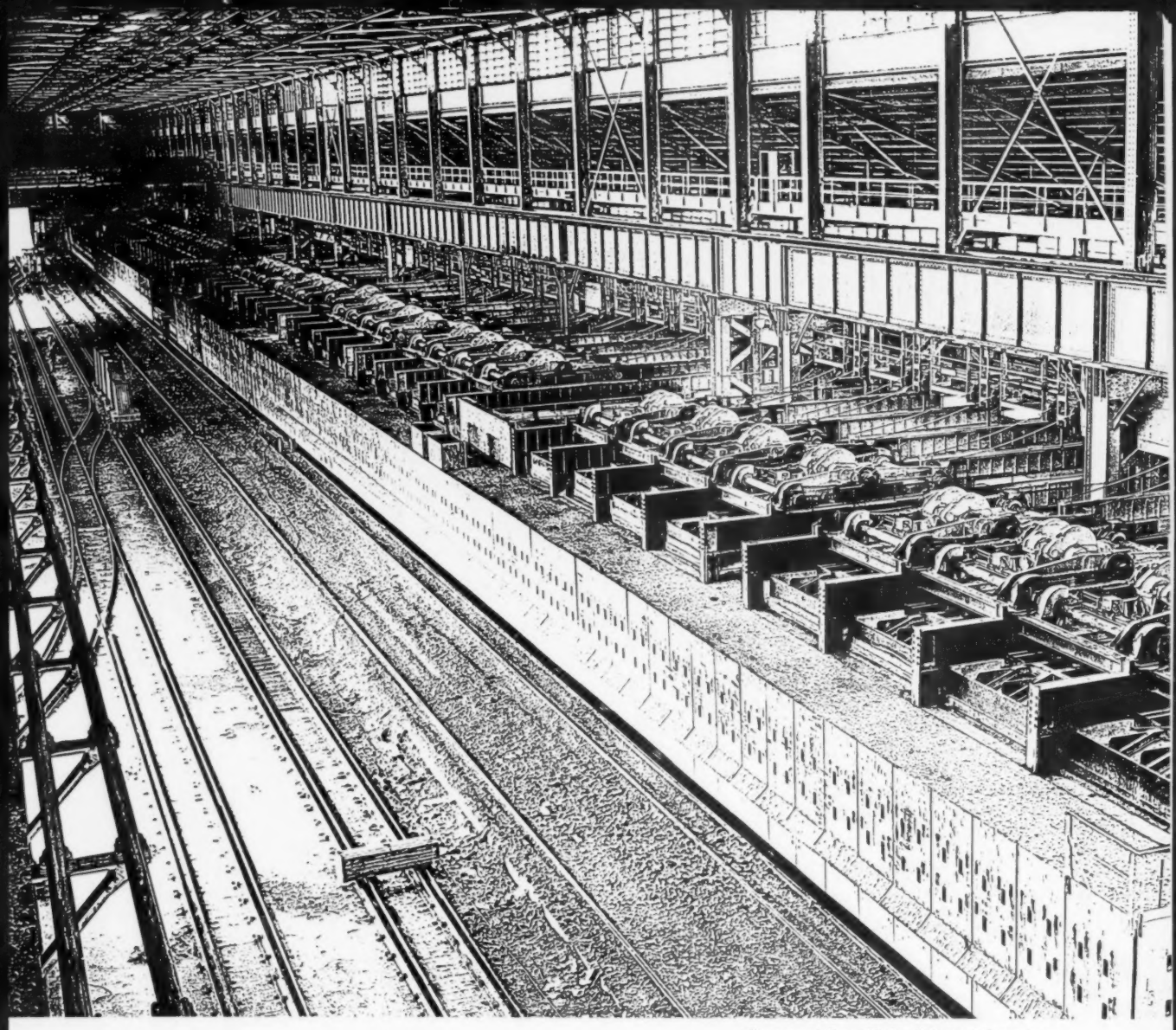
** 1/8-inch High Speed Cold Header*
27,000 Parts Per Hour

Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

HARTFORD DETROIT CHICAGO

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.



Courtesy of Gary Works, U.S. Steel Corporation

Gets them out the back door (750 tons/hr) This is the largest installation of soaking pits (48) ever built at one time. Engineered by Surface, it will heat an average of 750 tons per hour. At peak capacity, it loads the ingot buggies at a rate of 1200 tons per hour. A dual recuperator system applies the maximum amount of heat where it belongs—inside the pit.

SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR

Get fast,

reliable delivery of the aluminum extrusions you need!

from your nearby independent fabricator...

Supplied with quality ALCAN aluminum by Aluminium Limited

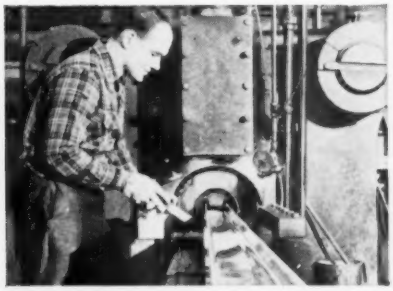
More and more, manufacturers are finding that their best source of extruded products is their nearby independent fabricator.

One reason—and an important one—is location. Because his plant is near yours, he can work closely with you in planning, pricing and engineering. He can give you convenient production scheduling . . . and assurance of on-time delivery to your plant.

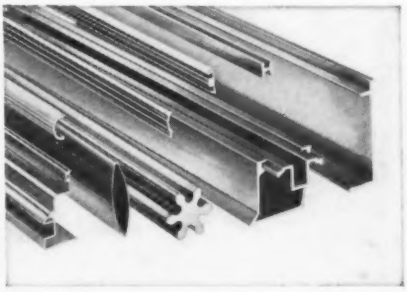
Another reason is his size . . . your business is important to him. He'll go all out to bring his many years' experience to the solution of your problems . . . to give you the quality, personalized service and unit cost that assure your repeat orders. Supplied by Aluminium Limited, your independent fabricator is backed by the research facilities of one of the world's leading aluminum producers.

Ask your aluminum extruder to estimate on your next order for semi-fabricated parts. You'll find him eager to give you the finest aluminum products at reasonable cost. Or, if you prefer, ask us to send you a list of independent aluminum extruders near your plant.

Design help. Your independent extruder is an aluminum specialist. Years of experience qualify him to help you develop the semi-fabricated aluminum shape best suited to economical fabrication.



Modern equipment. Investigate the facilities offered by your aluminum fabricator—you'll find him well equipped to serve you. His facilities, experience, location, and his personalized service make him your best source of semi-fabricated aluminum products.



Any shape . . . the right alloy. Your nearby extruder can turn out aluminum in a wide range of shapes to meet your most exacting requirements. He also works with you in choosing from a variety of aluminum alloys formulated by Aluminium Limited.

Aluminium Limited

ALCAN

In the U.S.—Aluminium Limited Sales, Inc.
630 Fifth Avenue, New York 20, N. Y.
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Aluminium Limited Sales, Inc., Dept. IA-511
630 Fifth Avenue, New York 20, N. Y.
Gentlemen: Kindly send me a list of independent aluminum extruders in my area.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State____

This Sandusky Centrifugal Casting—one of four produced for Westinghouse Atomic Equipment Department—meets radiographic, intergranular corrosion, and all other rigorous chemical and physical tests.

ONE SANDUSKY CENTRIFUGAL CASTING ...makes 4 giant stator shells

Specified by Westinghouse for 4 canned motor pumps soon to be integral parts of reactor system in Yankee Atomic Electric Plant in Rowe, Massachusetts

One king-size 17-ton Sandusky casting supplied the main motor bodies (stator shells) for the four pumps being built by Westinghouse, each to handle 23,600 g.p.m. of pressurized water through the reactor core.

The 25-foot-long Sandusky casting was centrifugally spun of a modified CF-8 (Type 304 L) stainless steel, then machined by Sandusky to a 3″ wall thickness, 31½″ on the O.D. This huge casting was hydrostatically tested to 3800 psi before being sectioned into four 68″ lengths.

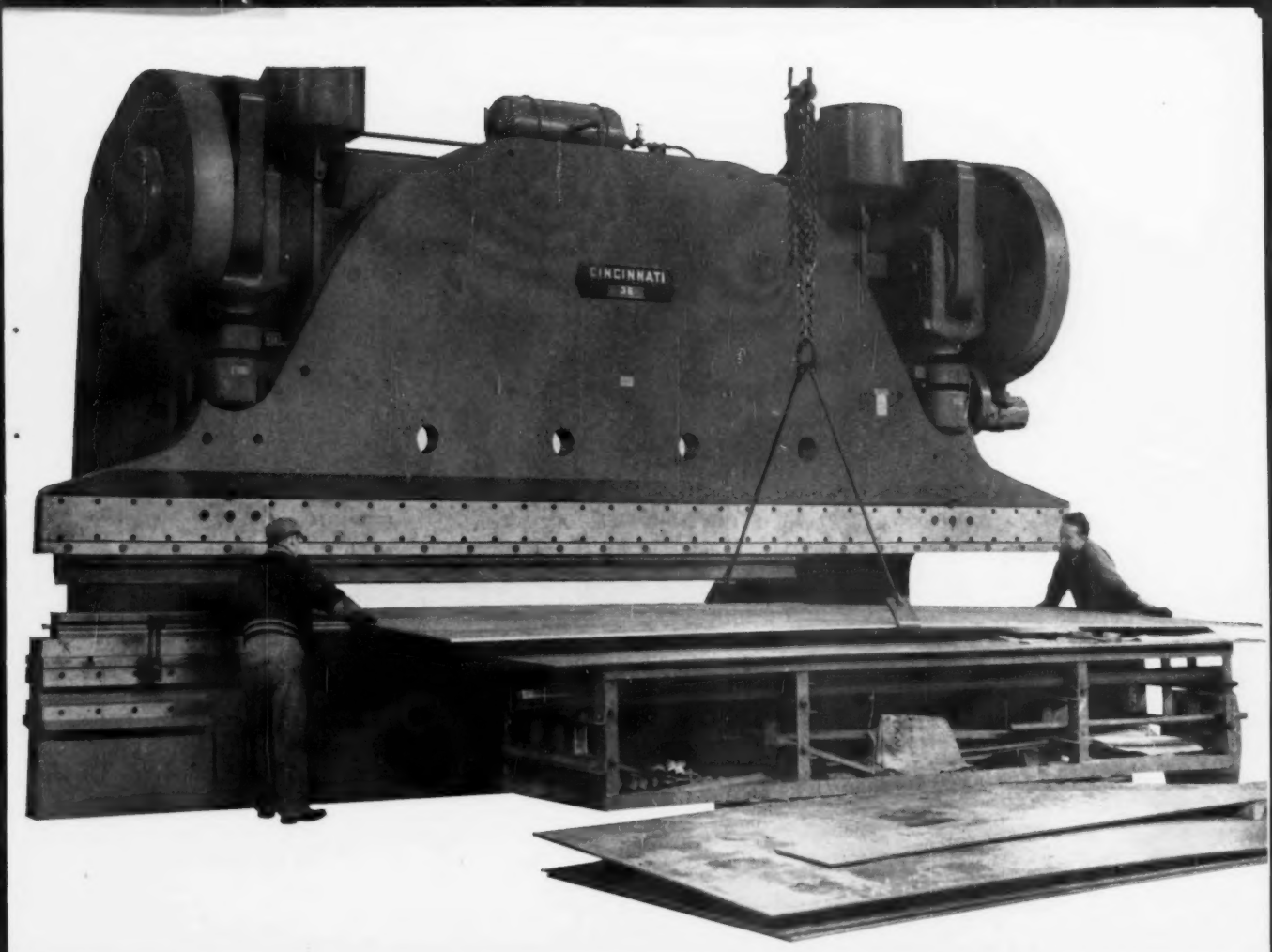
These stator shells represent another *new and exacting application* for Sandusky Centrifugal Castings—which may offer a practical and economical answer to *your* cylindrical requirements also. They are available in diameters from 7″ to 54″—in lengths up to 33 feet—in heat- and corrosion-resistant stainless, carbon and low-alloy steels and a wide range of copper-base and nickel-base alloys.

Let us show you how Sandusky Centrifugal Castings can help solve your cylindrical problems. Write to us at Sandusky, Ohio.

SANDUSKY CENTRIFUGAL CASTINGS

FOUNDRY & MACHINE CO.

SANDUSKY, OHIO Stainless, Carbon, Low-Alloy Steels—Full Range Copper-Base, Nickel-Base Alloys



CINCINNATI® PRESS BRAKE
gets new business

Bigger jobs, fewer welded seams, less handling, and easier operation—McGregor-Michigan Corporation gets all four advantages from this 36 Series Cincinnati Press Brake.

As a result, "this new brake . . . helps us be more competitive with some of the larger shops," says R. Hilprecht, sales manager of this steel plate fabricating shop.

This is another example of the way Cincinnati Press Brakes and Cincinnati Shears are reducing costs and opening up new business for shops across the country. If you don't have the new catalogs on these machines, both mechanical and hydraulic, please write for them.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

Machining greatly reduced by concentricity of

REPUBLIC ELECTRUNITE MECHANICAL TUBING

CRITICAL PART IN POWER STEERING PUMP made with Republic ELECTRUNITE Mechanical Tubing. Keyed bushing fits over engine crankshaft, provides pump drive for power assist. Close tolerance machining is essential for dual mechanical-hydraulic function.

Precise concentricity of ELECTRUNITE Mechanical Tubing solved a machining problem and cut costs for Eaton Manufacturing Company, manufacturers of power steering pumps.

At the heart of the power steering pump is a bushing made from heavy wall ELECTRUNITE which serves as the internal shaft of the unit. It fits on the crankshaft of the car and drives the power steering pump.

The tubing is ground on both the ID and OD. A keyway is broached on the ID the entire length of the part, approximately 2⅝ inches. Another keyway is then milled on the OD.

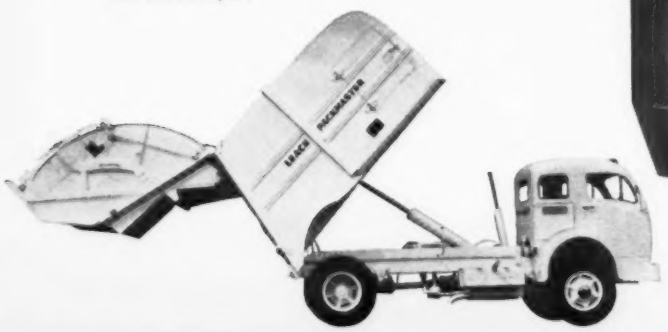
Since Eaton must work to very close tolerances on the part, concentricity of the OD and ID of the tubing are most important to minimize machining.

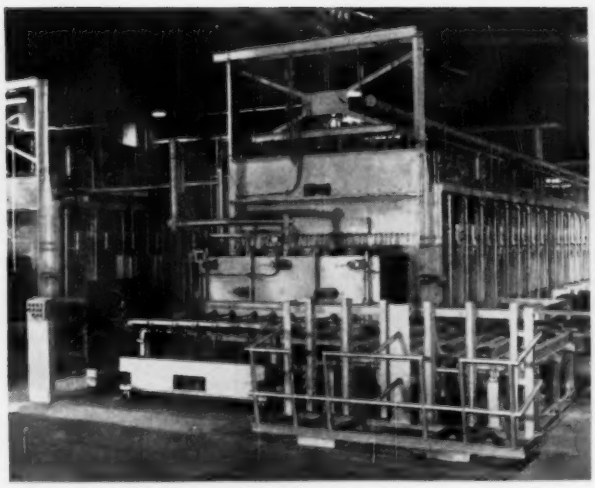
In addition, as it is part of a hydraulic system, the steel must be structurally sound without flaws of any sort.

This is another example of how precision fabricated Republic ELECTRUNITE provides high quality and cost savings for critical applications.

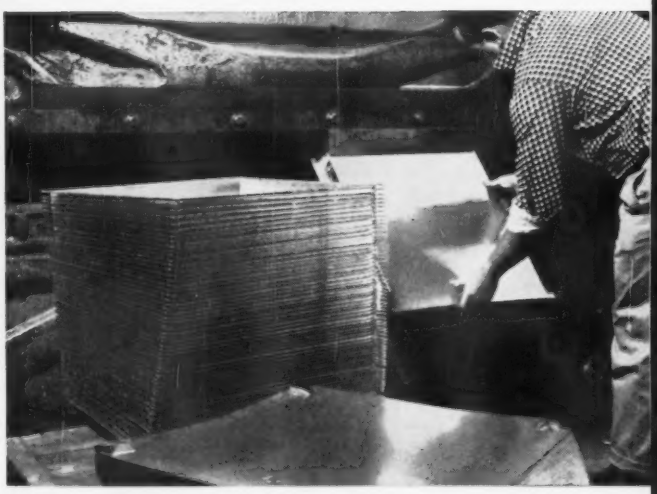
ELECTRUNITE is available in a wide range of sizes, gages, and wall thicknesses in both carbon and stainless steels to meet your needs. For full information call your Republic representative or send coupon below.

COLD FINISHED ALLOY BARS form high strength pins to carry the full weight (up to 5 tons) of this Packmaster body and its refuse load when unit is hoisted to unload. Republic Cold Finished Alloy Bars, cut off, drilled, and chamfered by Leach Company, Oshkosh, Wisconsin, manufacturers of the Packmaster, offer the toughness and abrasion resistance necessary in this application. Investigate the advantages of using Republic Cold Finished Alloy Bars for your component parts production. Mail coupon.





NEW ANNEALING FURNACES provide maximum heat treating capacity for cold extrusion steel. Quality of steel produced at the Chicago Bar Mill attains a high level of uniformity through heat treatment in two new atmosphere-controlled annealing furnaces. These new furnaces provide the capacity to assure prompt delivery of orders for heat treated steels.



BENDING, FLANGING, SEAMING—ductile zinc coating on Republic Galvannealed Sheets stays tight, resists flaking, peeling, or spalling. Hot dip galvanizing plus special heat treatment give Galvannealed a graduated coating of iron—zinc alloys between the pure zinc outer surface and the base metal. The tough, uniform protective finish that is spangle-free provides a good paint base, withstands temperatures to 750°.

REPUBLIC STEEL

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL

Strong, Modern, Dependable

Steel

REPUBLIC STEEL CORPORATION
DEPT. IA-2199
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send me more information on the following products:

- ☐ Republic ELECTRUNITE® Mechanical Tubing
- ☐ Republic Steel for Cold Extrusions
- ☐ Republic Cold Alloy Bars
- ☐ Republic Galvannealed Sheets

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

STOPS ACID WASTE IN CONTINUOUS PICKLING!

the Foxboro
Magnetic Flow Meter

Precise, accurate ratioing of acid-to-water for continuous pickling lines—with no acid wasted. That's the type of control you'll get with a Foxboro Magnetic Flow Meter as the heart of your ratio control system.

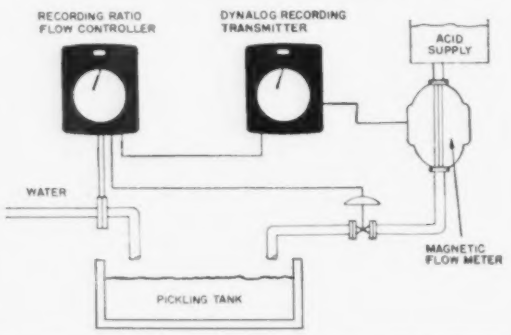
Measuring flow of acids and other corrosive liquids is no problem for the Magnetic Flow Meter. This meter has no orifice plate, no pressure taps—no line restrictions of any kind. There's nothing to corrode—nothing to take apart and clean. The meter connects by electric cable to a remote Foxboro Dynalog* Electronic Recorder.

Magnetic Flow Meters install as simply as a length of pipe—operate continuously with an over-all system accuracy of ±1%. Water-acid ratios stay right where you set them. Best of all, waste of acid is completely eliminated.

Ask your nearby Foxboro Field Engineer about the Magnetic Flow Meter, or write today for Bulletin 20-14C, which contains full information. The Foxboro Company, 805 Neponset Avenue, Foxboro, Massachusetts.

*Reg. U.S. Pat. Off.

Typical Water-Acid Ratio System
using a Foxboro Magnetic Flow Meter



FOXBORO
REG. U.S. PAT. OFF.
MAGNETIC FLOW METERS

BIG SAVINGS with STACKER CRANES

Save Space... Save Time... Save Handling Costs

You make savings in various ways with a Cleveland Tramrail Stacker Crane. You increase the storage capacity of a room because you make greater use of its cubic measurement, i.e., materials are stored to greater heights and aisleway widths reduced.

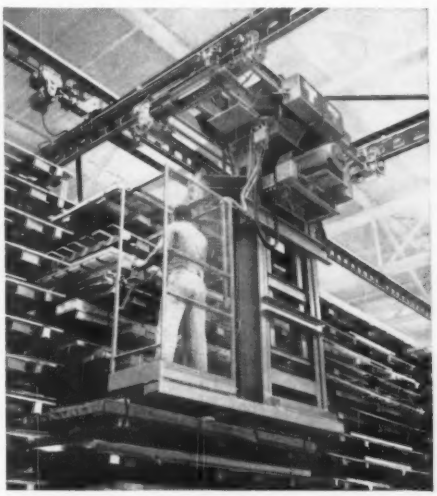
You save time because heavy, awkward loads are picked up, moved and set in place in one fast operation. No time is lost fastening chains, ropes or slings in place, or clamping a grab into position.

You speed handling because a Cleveland Tramrail Stacker Crane will deliver materials from a truck, gondola railroad car or any location on the floor to storage or other areas, directly, with no in-between handling.

You save man-hours because the stacker permits one man alone, operating controls in the cab, to take care of the entire materials handling job without need of floor assistants.

Various designs of Cleveland Tramrail stackers are available to suit practically any situation.

One of several types of Cleveland Tramrail stackers. This unit has a lift of 15'-6", turns 360° clockwise or counterclockwise and handles loads to 3 tons. The mast telescopes and when fork is in high position, the clearance underneath to floor is nearly 8 feet.



Materials are easily lifted on and off racks. All controls are in the stacker cab which also travels up and down to always provide the operator with a close-up view of the load. This equipment permits fast, easy materials selection. Operator can maintain inventory record in stacker cab.

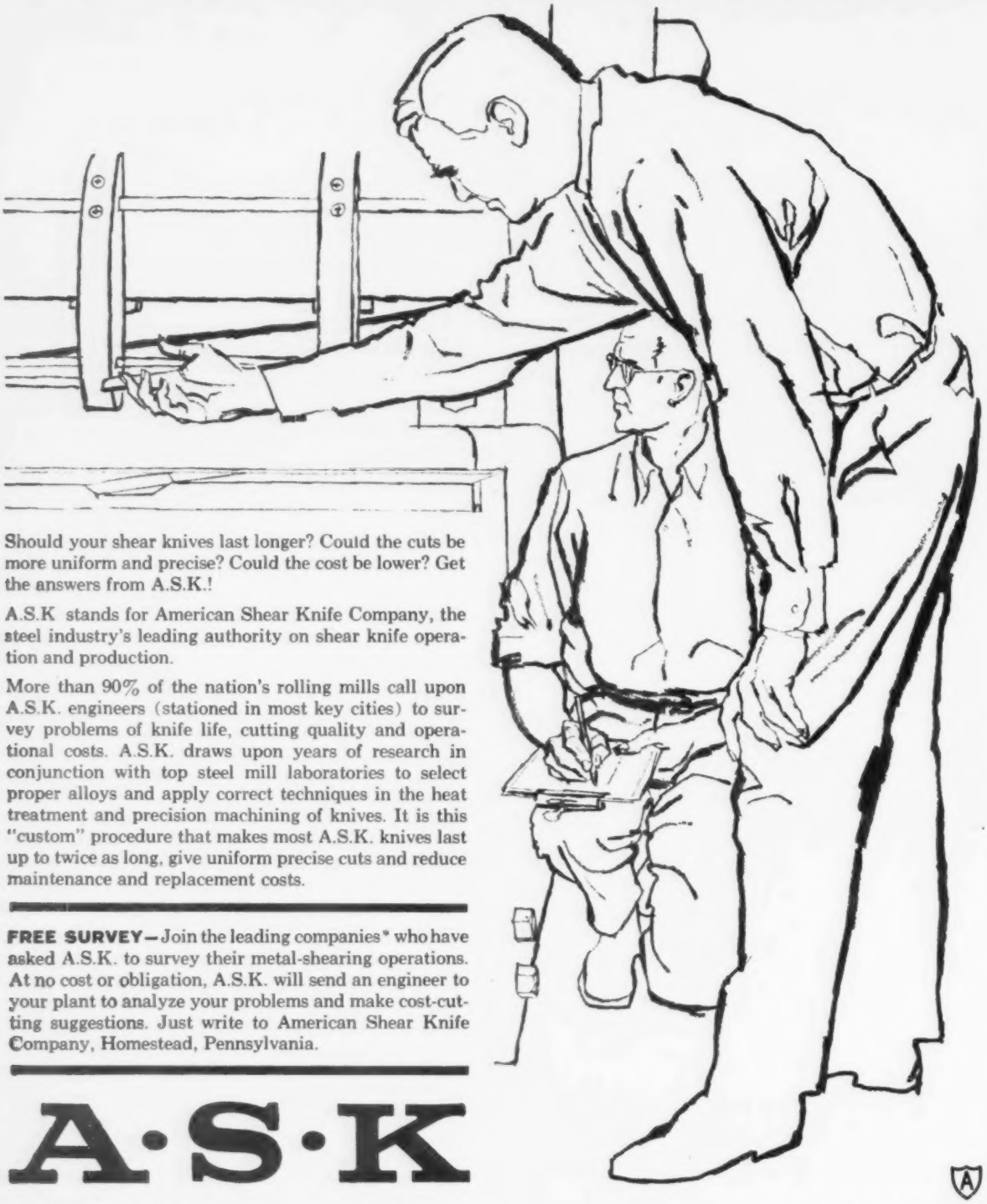
CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4859 E. 290 ST. • WICKLIFFE, OHIO

Can you get more wear from your shear knives?

A·S·K for the answer!



Should your shear knives last longer? Could the cuts be more uniform and precise? Could the cost be lower? Get the answers from A.S.K.!

A.S.K stands for American Shear Knife Company, the steel industry's leading authority on shear knife operation and production.

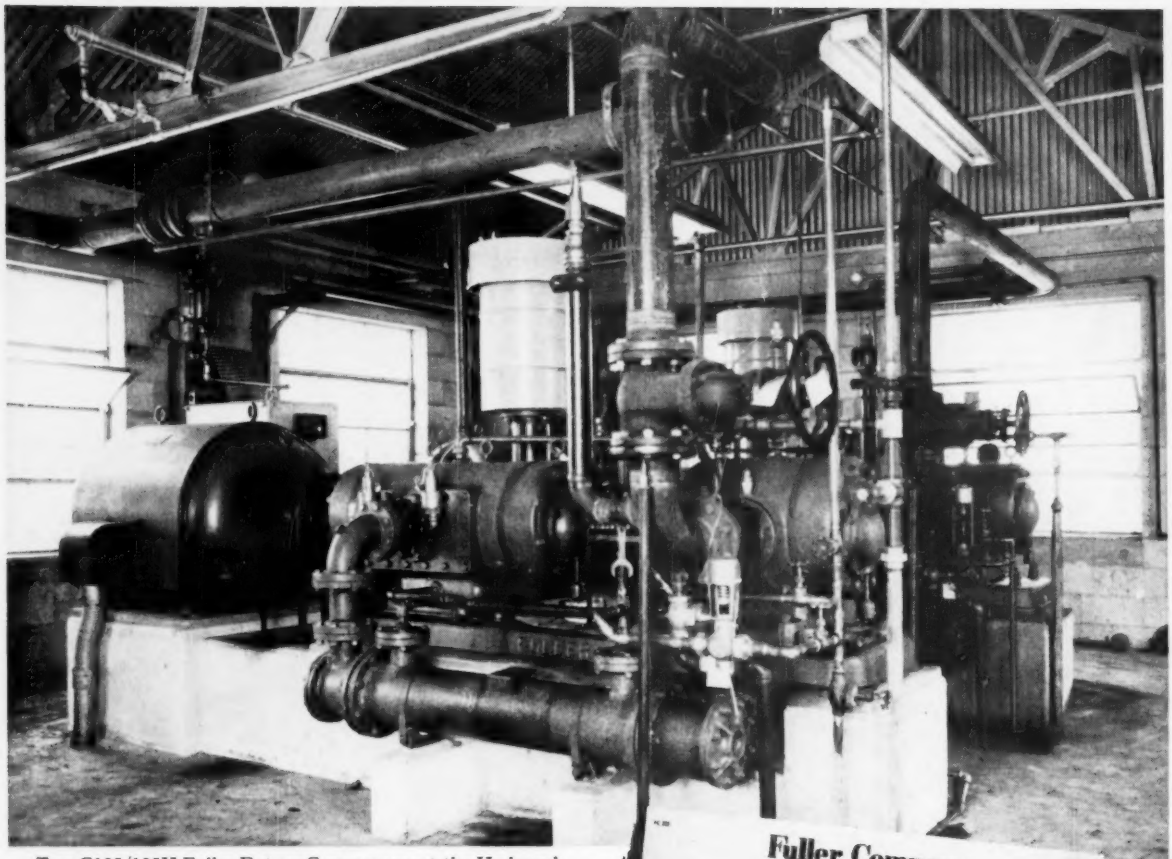
More than 90% of the nation's rolling mills call upon A.S.K. engineers (stationed in most key cities) to survey problems of knife life, cutting quality and operational costs. A.S.K. draws upon years of research in conjunction with top steel mill laboratories to select proper alloys and apply correct techniques in the heat treatment and precision machining of knives. It is this "custom" procedure that makes most A.S.K. knives last up to twice as long, give uniform precise cuts and reduce maintenance and replacement costs.

FREE SURVEY—Join the leading companies* who have asked A.S.K. to survey their metal-shearing operations. At no cost or obligation, A.S.K. will send an engineer to your plant to analyze your problems and make cost-cutting suggestions. Just write to American Shear Knife Company, Homestead, Pennsylvania.

A·S·K

American Shear Knife

**names supplied on request*



Two C135/135H Fuller Rotary Compressors at the Herbrand Division of the Bingham-Herbrand Corp., Fremont, Ohio, leading manufacturer of forged mechanics' hand tools and steel forgings for the automotive industry. Each compressor is rated 680 cfm, atmosphere to 100/110 psig., at 690 RPM.

Here's the 4-Year Maintenance Bill on Fuller Rotary Compressor at Herbrand Division of Bingham-Herbrand Corp.

So satisfactory was the performance of its first Fuller Rotary Compressor, installed in 1956, that Herbrand Division installed another like it 3½ years later.

When the older unit was inspected after four years operation, no replacement of parts was necessary. After installation of a new gasket (cost $9.35)—to replace the one that had to be removed to make inspection—the compressor continues to add to its service record.

The newer compressor has also been entirely trouble-free, and Herbrand plans a third, when increased air capacity is required. It, too, will be a Fuller—for, as Herbrand says, "These compressors can be classified as maintenance-free."

Because Fuller Rotary Compressors are practically vibration-free, they can be installed without complicated or expensive foundations or structural modifications. They are simple and efficient, with no valves to leak, no seats to grind. Blades automatically compensate for wear. They have forced-feed lubrication to all parts within the cylinder. Rotor, bearings and blades are the only moving parts.

Fuller Compressors range from 30 to 3300 cfm, pressures to 125-lb. gauge.

Write for Bulletin C-5A. It tells the whole story.

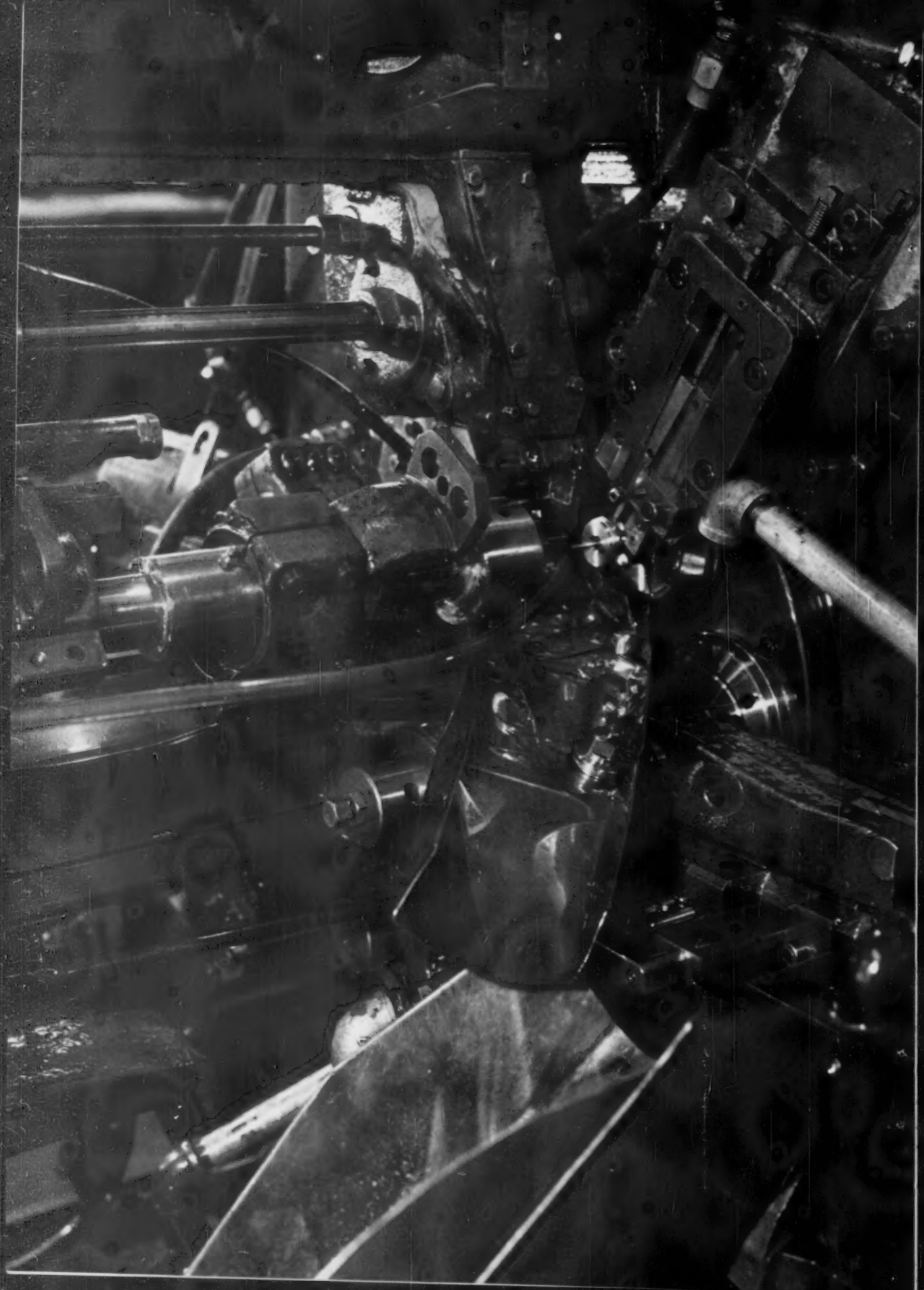
See Chemical Engineering Catalog for further details and specifications.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
122 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

2852
C-364



LEAD

Youngstown leaded steels increase your production, prolong tool life

Adding lead to steel is a Youngstown art, hard to learn. You add the right amount at the right time. Disperse it. Keep the content range correct. Check it, test it, inspect it, control it from the teeming floor to finished hot rolled and cold drawn bars.

Youngstown Yolead and other leaded steels give you better machinability, longer tool life and faster cutting speed. You get more reliable performance, improved ductility. You get lower costs. From small carburetor fittings to big automotive forgings, Youngstown can provide the exact leaded grade that you need, when and where you need it.

Get all these advantages with leaded carbon and alloy steels from Youngstown. Get fast, dependable delivery from your Steel Service Center, and through 28 Youngstown offices. Get quality, get performance, get leaded steel from Youngstown who knows how to make lead behave inside steel.

Youngstown – growing force in steel

For more information about Youngstown leaded steel, write: Dept. 15-B
The Youngstown Sheet and Tube Company, Youngstown, Ohio

"Our die casting demands the instant, controlled heat of GAS"

R. D. Bliss, Vice President, Wheaton Die Cast Company, Millville, New Jersey

Wheaton Die Cast Company produces zinc and aluminum castings. In melting the metals, they demand the heating speed and precise temperature control that only *gas* can give them.

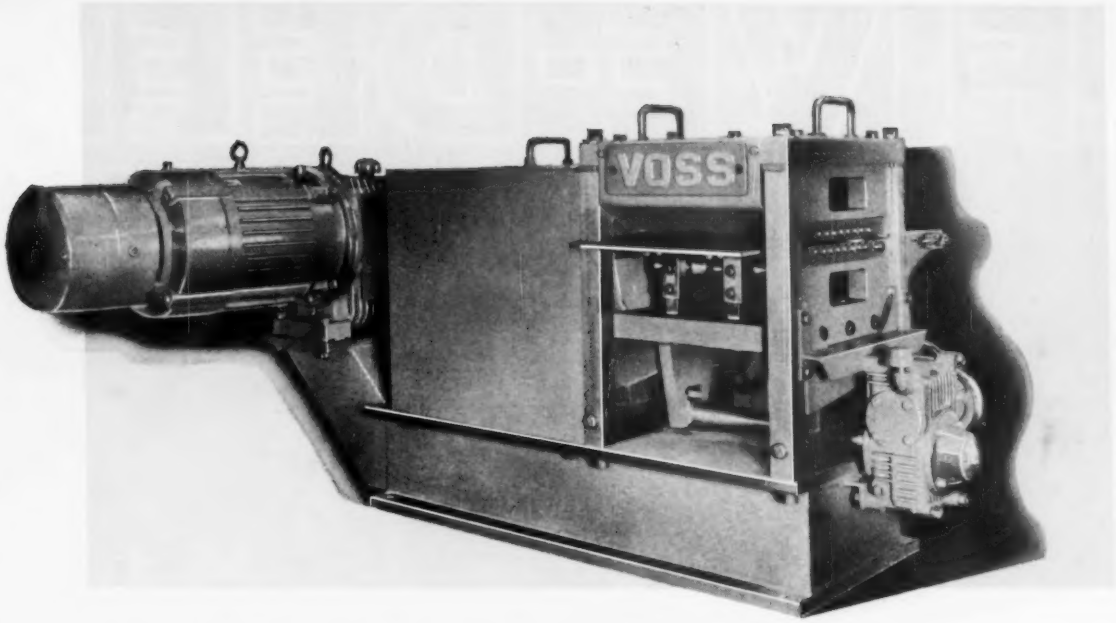
With gas heat, in custom-made equipment, Wheaton has perfect control of the 825° F. they hold in zinc die casting, and 1200° F. with aluminum. They also find that gas is cleaner and more dependable than other fuels for their operation.

Wheaton has eliminated downtime delays with the speed and efficiency of gas. It's their choice of fuel for all heat processing—as well as for heating the plant—because of its unbeatable economy, uniformity and dependability.

Thousands of companies find that gas is technically right and economically sound for all types of heat processing. Let gas help you improve processes, cut costs. Call the Industrial Sales Engineer at your local Gas Company.

American Gas Association

FOR HEAT PROCESSING... GAS IS GOOD BUSINESS!



HERE'S THE MACHINE THAT'S REVOLUTIONIZING STAMPED PARTS-FLATTENING*

DEAD FLAT—FAST! That's what the Voss stamped parts-flattener does. As fast as it's fed, it achieves within .005 of dead flatness—*in one pass.* Eliminates hand flattening on an enormous variety of stamped parts. Can even be engineered to flatten parts having irregular surfaces.

COMPACT: Most models are compact enough to sit on a desk top. Yet the flattener inherits the ruggedness of the famed Voss Precision Roller Leveler.

* One major user reports that 2 Voss parts-flatteners and a few operators have replaced 300 workers engaged in hand flattening operations.

We'll be glad to arrange a demonstration with your parts, without obligation.

Voss ENGINEERING CO.

7301 Penn Ave. Pittsburgh 8, Pa. Churchill 2-4422

(Makers of the Voss Precision Roller Leveler)

FIVE-DEEP

Traveling four times as far as the moon

to help you profit with UCM's "FIVE-DEEP" Ferroalloys

1 Customer Service, ready as your phone, brings Union Carbide Metals' field engineers to your melting plant—from any of 9 sales and service offices. In providing on-the-scene assistance, they gladly make available UCM's integrated experience in the application of ferroalloys to various melting practices.

Lately, their travels to mills and foundries have soared to well beyond the million-mile mark—each year! This customer service is just one of the 5 intangible but ever-present extra values of UCM's FIVE-DEEP alloys which mean better products and bigger profits for you. The others:

2 Technology—many million dollars worth a year—helps you produce better, more profitable metals. UCM's 600-man research and development center is the birthplace of hundreds of new alloys.

3 Unmatched Facilities free you from delivery worries. Only UCM gives you 6 plants—3 with their own power facilities—and 17 warehouses, all located for fast shipments by rail, truck, or water.

4 Global Ore Sources assure you uninterrupted supplies of ferroalloys. UCM's close association with world-wide mines provides dependable raw material sources.

5 Strictest Quality Control—with over 100,000 tests per month from mines to shipment—makes sure you always get alloys of uniform size and analysis, with minimum fines, lot after lot.

For better metals, production economies, bigger profits, insist on UCM's FIVE-DEEP alloys. Union Carbide Metals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y., producer of "Electromet" brand metallurgical products.

"Union Carbide" and "Electromet" are registered trade marks of Union Carbide Corporation.

UNION CARBIDE METALS

Only **ELECTROMET** ferroalloys from **UCM** are so deep in extra values to help you.

PURCHASING AGENTS REPORT a "gradual price stabilization with slight upward tendencies," in April survey of National Assn. of Purchasing Agents. While 79 pct reported prices to be "the same" as previous month, 14 pct said they were paying higher prices than the previous month. Price resistance is "strong."

THE GROWTH OF THE SPACE MARKET in the 60's will double the growth of the electronics market of the 50's. This is a forecast made by A. W. Robinson, GE's manager of space business development. He says the space market will increase from $1 billion per year in 1960 to $8 billion per year in 1970.

BIG MARKET FOR SMALL COMPANIES. A survey shows that more than 70 pct of General Motors Corp. suppliers have fewer than 100 employees. In 1960 GM paid over $6.3 billion to some 30,000 suppliers.

MORE GOVERNMENT CONTROL OF EXPORTS is reported in the works. The idea is to foster European trade groups. Export marketers may have to shift sights from European markets to areas where the Administration wants trade stepped up. Best prospects for more export trade: Canada, Africa, Japan.

THE COMPUTER INDUSTRY promise is fast coming true. One report says 4500 electronic computers are in use in the U. S. And orders on books of manufacturers almost equal the number of computers sold so far. The report also states that IBM is already mass-producing one medium-size computer, turning out 10 a day. One expert forecasts 20,000 computers in use by 1970.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows an increase of 37.1 pct for March over February. The March index was 299.3 (1947-49=100) for new bookings. This is well above the 1960 average of 235.5. The index of shipments rose in March to 246.8, up from 214.4 in February.

AIR-CONDITIONING SALES made gains in 1960 and promise to share further in the general recovery this year. Makers shipped 336,000 residential and smaller commercial units in 1960, up 10 pct over 1959. Big "systems" were up 12 pct for a $800 million volume. With construction on the upswing, and owners and tenants insisting on air-conditioning, a banner year is expected.

Titan® RC Hex

Titan's new *RC Hex* is free-cutting brass hexagon rod with radius corners.

It offers exciting new advantages when used on screw machines. It is best for making bolts, nuts, hydraulic and automotive fittings, and other parts where the hex serves as a wrenching shape. Here's why:

Superior Points of *RC Hex* Brass Rod

- Weight-per-foot saving averages ½% over conventional sharp-cornered hex rod. Costs are less.
- Screw machines can take larger rod because of reduced dimension across Titan *RC Hex* rod corners.
- Screw machine operations are quieter and safer because sharp hex corners are rounded.
- Stock tube liners last longer. Machine downtime is reduced because of "rounded" hex bars. "Corner" damage is less. Higher speeds can be used.
- Parts made of Titan *RC Hex* take superior plating because of reduced buildup on corners. Finishing costs less.
- *RC Hex* facilitates assembly of finished parts.
- "Rounded" machined hex pieces don't nick or burr during handling and shipping.
- Finished products made from Titan *RC Hex* have improved "rounded" quality look... added to the natural beauty and strength of being brass.

T.M.

Titan produces *RC Hex* rods in many sizes. Most are from ½" to 2½" across flats. "Special" die sizes are standard at Titan. Let us know your needs.

Consult Mill for *RC Hex* in alloys in addition to Free-Cutting Brass.

Order Titan *RC Hex* from your nearest Titan Man. Rapid shipments are made to you direct from four Titan brass rod mill depots: Bellefonte, Pa.; Seymour, Conn.; Indianapolis, Ind.; Newark, Calif.

Established 1915

Write for RC Hex
die size list
and catalog data

Chrome-plated brass parts machined from Titan *RC Hex*. Reduced buildup on corners gives superior plating results.

TITAN® METAL MANUFACTURING COMPANY

DIVISION OF **CERRO CORPORATION**

Bellefonte, Pa. • Newark, Calif. • Offices & Agencies in Principal Cities

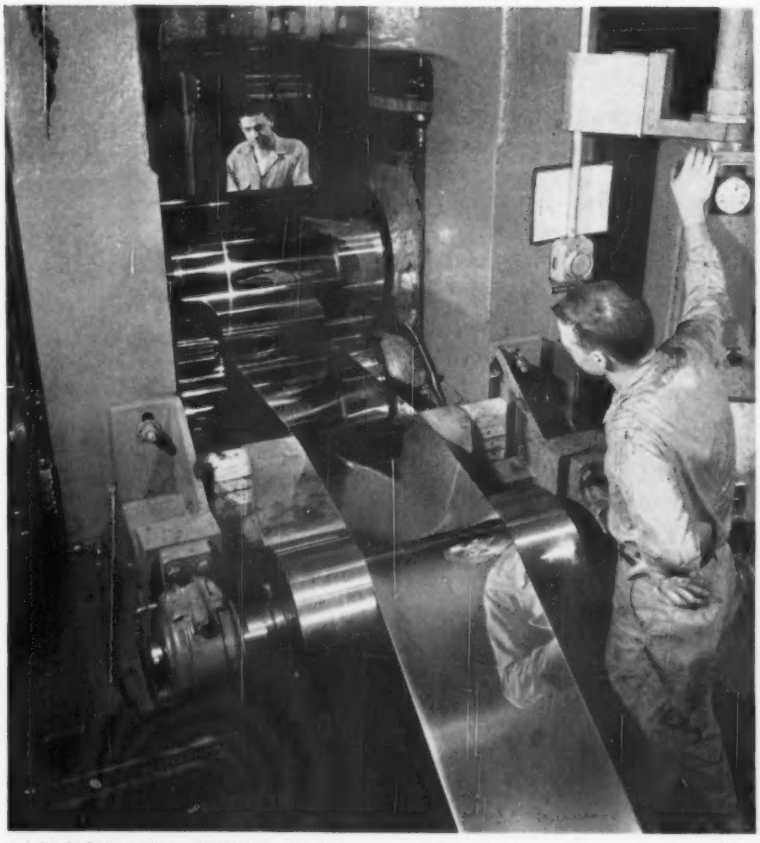
RODS • FORGINGS • DIE CASTINGS • WELDING RODS • WIRE

Commodity Pricing Hits Steel

Stainless Producers Debate on New Muffler Stock

Steelmakers have shied away from commodity pricing, claiming it undercuts other prices.

But Allegheny Ludlum's new stainless muffler stock, with a special price, reopened the question of commodity pricing.
By G. J. McManus



PAY FOR THE SHINE?: Stainless steel is noted for its lustrous surface finish. But should you pay for it if you don't need it?

■ The prospect of a stainless steel muffler is stirring both hopes and doubts in steel producers.

On the one hand, producers see an application that could increase automotive use of stainless by 25 pct. On the other side, some fear they may be looking at the start of commodity pricing for steel.

This emotional split centers on the approach Allegheny Ludlum Steel Corp. has taken in developing the muffler market. Allegheny Ludlum has come up with a special grade for the application. Designated MF-1, this grade is being sold for something like 28¢ to 30¢ a pound.

Special Price—Company officials say frankly this is a commodity price, based on the quantity and quality requirements of exhaust systems. A perfect finish is not necessary; alloy content is tailored to special needs; production is geared to tonnage orders.

Working with this combination, Allegheny Ludlum has put a special low price on material that is said to extend muffler life at least three times. MF-1 is called 15 to 18 times more corrosion resistant than conventional mild steel.

Beneath It All—The new grade has had an encouraging reception. It was revealed by The IRON AGE in February that Ford Motor Co. was putting MF-1 stainless mufflers on Thunderbirds. More recently, Allegheny Ludlum said Ford will try stainless mufflers on all dual exhaust cars.

In addition, six fabricators are testing MF-1 stainless for tail pipes. Two suppliers are working with MF-1 for replacement mufflers.

All this adds up to a staggering potential for stainless. According to Allegheny Ludlum, the mufflers being used on Thunderbirds take 7 lb of stainless. If this same amount had been used on all new car mufflers in 1960, more than 20,000 tons of stainless would have been needed. For all uses last year, auto plants took 85,000 tons of the metal.

Muffled Reaction—The reaction of other stainless producers to the muffler program varies widely. Some say Allegheny Ludlum's approach is sound and imaginative. Others say the basic idea is all right, but MF-1 has been priced too low to give any profits. A third group dis-

What About Commodity Price?

What It Is

A commodity price is a price charged for a product with a specific end use. The price is arrived at by some other means than published lists of standard charges.

Where It Is

It is widespread in the aluminum industry. Fin stock, can stock, duct sheets, buss bars, and building sheets are among the products sold at special prices. Brass mills are using commodity pricing for zipper wire and some types of foil. Bordering on commodity prices are practices like "volume realization" contracts for hardware and paper boxes, experimental prices for new products, and informal quantity discounts.

What It Does

It enables a supplier to enter or enlarge a market. Backers say the system is justified by volume and other special considerations. Critics say it leads to general price deterioration and other headaches.

Where It Is Going

It is spreading into the steel industry. For years, mills have priced metal strictly on a product basis. As one steel executive put it several years ago: "We have a one-price policy. When a change is made in our f.o.b. mill price, the new price applies to all of our customers." Now, however, a new grade of stainless steel has been designed and priced specifically for auto exhaust systems.

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likes the whole idea of commodity pricing.

"You can say we're concerned—very concerned," said the stainless manager of one large mill. "Commodity pricing is entirely logical in theory, but look what's happened to aluminum profits."

"I'm against it in any form," says the sales vice president of another mill.

Opening Wedge? — Objections center on future implications rather than the particular move at hand. Once you open the door, say critics, you can't confine special pricing to one or two special uses. The variety of prices for aluminum in different auto applications is cited as an inevitable outgrowth.

Backers of the move maintain the combination of quantity and quality offered by mufflers is unique in the stainless field. Even in functional applications, finish or high alloy content is required. Oil burners and a few others can get by without a perfect finish, but they do not take large quantities.

Tonnage Basis—Allegheny Ludlum says it is thinking strictly in terms of tonnage orders. Minimum quantity requirements have not been spelled out publicly, but mill officials appear confident they can stay away from small orders.

Equally important, there is no need for a decorative finish. MF-1 is being used on mufflers, which are out of sight, and only on the inside of mufflers.

With quality leeway and with large volume, Allegheny Ludlum says it can get away from the extreme fussiness of normal stainless production. It expects to run the MF-1 material through almost like a tonnage steel. Special alloy content is a final economic factor.

Cost Barrier?—If MF-1 stainless continues to make gains, other producers almost certainly will have to attempt similar programs. One mill is working on a muffler grade now and thinks it can meet the price restrictions with a very small profit. Another is working but says it has come up with nothing that will give a profit at present prices.

Two others indicate they have found no way to lick present economics. One of these is pessimistic about the whole program but says a second look will be taken if MF-1 gains general acceptance.

New Thinking Needed—In discussing the hazards of a general move to commodity pricing, producers point first of all to the recent experiences of aluminum. They recall, also, that commodity pricing was used for stainless in the '30's.

However, a marketing man feels it was through special pricing that stainless opened up the big automotive market 30 years ago. While not advocating a return to old methods, he suggests that an "imaginative" look at new markets could reveal possibilities for tonnage.

Where Problems Arise — The problems seem to arise when commodity prices are set so low as to be strictly promotional or when the system is used to offer general purpose material at a special price to one class of user.

A price of 28¢ for aluminum oil can stock is classed as subnormal by some aluminum men. The problem of distinguishing a commodity from general purpose material arose when building sheets were first put on a special schedule by Aluminum Co. of America.

Customers began taking advantage of the low prices by using building sheets for a wide range of applications. Alcoa had to revise its schedule, eliminating a number of sizes and increasing prices.

Will It Happen Here? — One stainless man feels the muffler program could lead to this kind of difficulty. Different mills will offer different shades of quality, he says. Ultimately, someone will upgrade his sheet enough so it can be used for desks or other alien applications.

Demand Lags for Lakes Iron Ore

Low level of steel operations and loaded ore docks will combine to hold Lakes ore demand down.

But the outlook is bright for high iron content imported ores. They may set new records in 1961.

By T. M. Rohan

■ Iron ore shippers are slowly rousing themselves for a half-hearted effort this year.

"You have to chin yourself to get a floor level view," says Oliver T. Burnham, vice president of the Lake Carriers Assn., Cleveland.

The outlook on the Great Lakes this season is for about 52 million tons of iron ore from the Lake Superior district. Imports from South America and Labrador will again increase their share of the market. Contrasting sharply with the U. S. picture are Europe and Japan which are ore hungry.

Near Record Low — For the Great Lakes, 52 million tons would be ahead of strike-crippled 1959 when 44 million tons were moved. But it would still be only about equal to the 1958 recession year total of 52.8 million tons which at the time was the lowest post-war year. The post-war peak was 95 million tons in 1953.

There are several problems. There's so much ore on hand on receiving docks already that even if the steel industry operations should go up sharply, ore shippers expect little step-up. Tonnage on hand as of February was 62 million tons or 18 million over the 44 million tons last year.

Also there's little prospect of a price increase because of the flood of low price imports. So, the Lake Superior district will swallow increased costs for another year. Their last raise was the 1957 season.

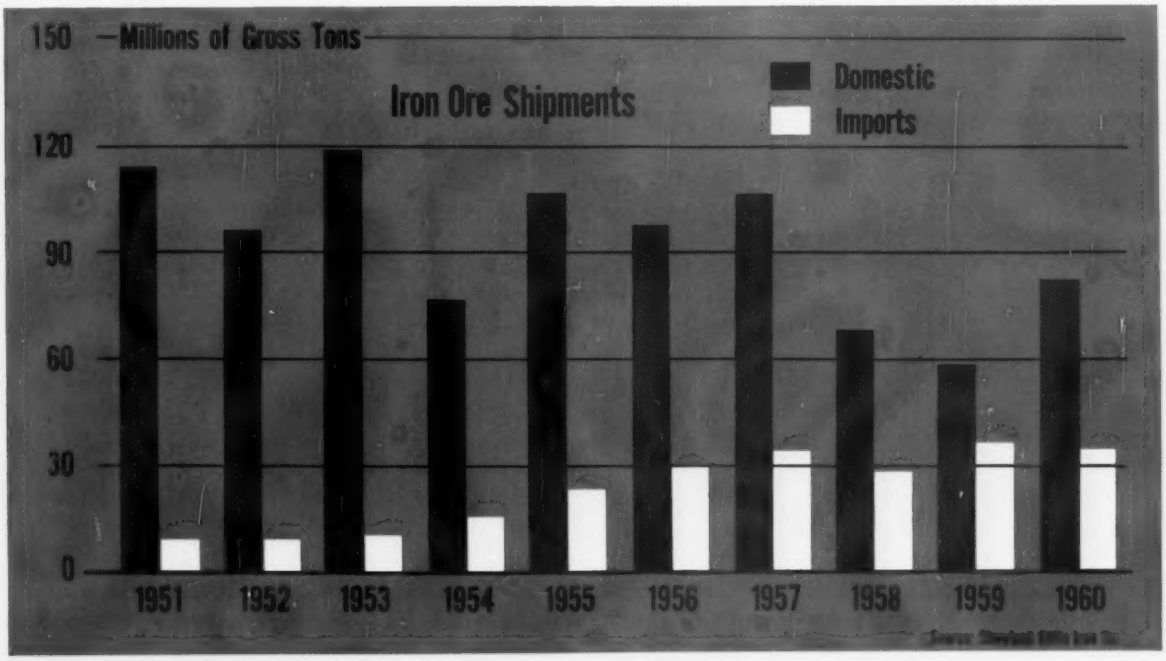
No Big Rush — Even pellets, the most desirable grade of all, are being sold off by project partners. About 1 million tons of Reserve pellets are being offered this year by Oglebay-Norton Co., Cleveland, and are moving well on spot sales.

Great Lakes boats are in no hurry to get out at all. And it's possible that no more than 60 or 70 out of the Lakes fleet of 230 may sail at all.

Imports Pour In—But a major new force, imported ore from U. S. overseas operations, continues to enlarge its scope share of the market. This year it stands an outside chance of reaching its highest percentage yet. The prospects are increased with U. S. Steel's Quebec Cartier Mining project in Labrador coming in. And continued heavy shipments are expected from South America.

The imported ore is rich. Consequently, low price on an iron unit basis plus some favorable rail freight rates, handicaps Lake Superior district ore.

Foreign Ores Get More and More of the Market



LIFT TRUCKS: Handling equipment of U. S. origin were displayed by Yale & Towne and Allis-Chalmers.

CONTROLS: All types of controls were on hand. This is the booth of Westinghouse International.

U.S. Names Grow at Hanover Fair

Every year the list grows of American companies exhibiting at European Trade Fairs.

Managing Editor E. C. Beaudet, just back from the Hanover Fair, reports U. S. companies rank second only to France among non-German exhibitors.

▪ American companies are steadily laying greater claims to world markets.

Nowhere could it be seen better than at the German Industries Fair at Hanover these past two weeks. The 5.5 million sq ft of exhibition space was studded with the best-known names in U. S. industry.

Made by European subsidiaries or American-based plants, industrial products bearing U. S. trademarks ranged from strain gages you can hold in you hand to king-sized roller bearings arm-length in width.

Climb to Second — Office machines and material handling equipment accounted for a good measure of U. S.-purchased floor space. And consumer goods like electric shavers, cameras and small appliances attracted the attention of foreign buyers.

All in all, some 128 American companies had come to the Fair. This is 40 pct more than the number which exhibited in Hanover last year. And it moved the United States from fifth to second place among the number of non-German exhibitors.

Iberian Tools—Leading the list of foreign exhibitors was France with 260 companies. Next came the United States with its 128 and then Austria with 124, Great Britain with 107, Switzerland with 106, the Netherlands with 65, Italy with 63, Sweden with 61, Belgium with 40 and Denmark with 31.

Eastern Bloc nations were represented by five trading organizations from Poland, Hungary and Czechoslovakia. And for the first time on hand were machinery builders from Spain and Portugal.

German companies, of course, topped the list of 5120 exhibitors with over 4100 companies. On a product basis, 1600 machinery builders led all other groups.

Meet New Customers—American exhibitors were by no means only interested in the German market. They were also drawn to the Fair by the prospect of meeting buyers from other European countries and those underdeveloped lands now getting industrialization programs underway.

But for U. S. industry the German market is a sufficient lure in itself. A spokesman for Adressograph-Multigraph, which has seven plants in Western Europe and a new $500,000 plant in Frankfurt, sees a terrific market for office equipment in West Germany.

"Five years ago," he reports, "German companies were twenty-five years behind the United States in office automation. In the next five years we expect them to be on a level with the U. S."

So far this year, his company's sales in the area are running 40 pct ahead of 1960.

Fair Business—Other American office equipment makers report the same bright outlook. The main rea-

BEARINGS: Timken and Fafnir represented the U. S. among companies exhibiting industrial bearings.

HYDRAULICS: Vickers GMBH in West Germany makes 60 pct of the products in the company's line.

son: The severe labor shortage in West Germany. An IBM salesman puts it this way, "It is impossible to find employees on the German market. People here must be receptive to new labor-saving ideas."

At this stage, German companies are looking to IBM for the more flexible, less costly data processing and electronic office equipment. Early in the Fair orders placed came to $500,000.

Spending Is High — Another American company, Whirlpool Corp. of Ann Arbor, Mich. is now getting ready its new coin-operated drycleaning machine for the German market. Whirlpool sees a big potential because of the relative newness of vending machines in Germany as compared with France and England.

While Whirlpool does have plants in Europe, no decision has yet been reached as to whether the dry cleaning machines will be produced there or in the U. S. Factors to be considered are a 25 pct duty on imports, switching from American to European electrical cycles and preparation of catalogs and sales material for German consumption.

The high rate of new plant and equipment spending in West Germany was the strongest attraction for U. S. exhibitors at Hanover.

It is now running about 15 pct higher than last year at this time. Since no further increase in output can come from adding to the already tight labor force, gains can come only from higher productivity.

CONSUMER GOODS: Visitors were treated to a free electric shave by Sunbeam International.

NEW PRODUCT: Whirlpool Corp. is moving fast with its new coin-operated dry cleaning machine.

Tin Price Is Starting to Firm

Balance of Pressure Should Hold Current Level

Tin is at its highest price since 1956. But many say it won't go higher now. It won't go lower, either.

There is a balance of pressure from both corners. This should keep a stable price.

By F. J. Starin

■ The price of tin—now at $1.09 per lb—is at its highest point since the Suez crisis cut normal supply lines in 1956.

And the situation this time, though less critical, is more complicated. However, some in the industry say the price is not likely to move much up or down in the near future.

Reason: The pressures in both directions about balance each other at the current level.

Upward Pressure—One of the major factors exerting upward pressure is the improvement in U. S. demand. Tinplate business is one of the brightest spots in the steel industry. Also, there is continued high demand for tin in Europe and Japan.

Industry sources also guess that, while there are notable exceptions, platers are light on inventory. In addition to meeting increased demand, U. S. platers must stock up.

Tin consumption in the U. S. last year was close to 52,000 tons. This year it will be more. R. D. Coursen, Malayan Tin Bureau, predicts consumption of at least 53,500 tons.

Problems — On the production side there are problems. Tin isn't moving in quantity from the Congo —normally a major world supplier. Bolivia continues to have financial problems and is able to move less and less metal.

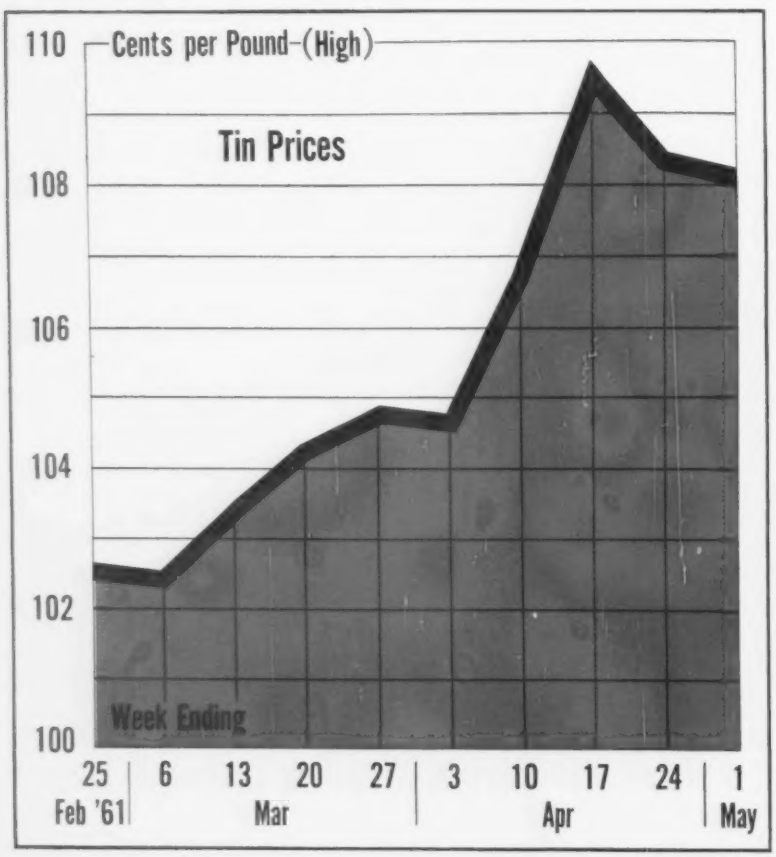
Even in Malaya, a consistent supplier, there are problems. Many tin miners there are small, independent operators. In order to increase production they must spend an average of $80,000 to $100,000 for machinery. So far, few have found the return sufficient to warrant the investment.

Among the pressures for lower tin prices are these: There are a number of tin stocks that can be put on the market quickly. Perhaps the most important to U. S. consumers is the special tin inventory of 3933 long tons. This represents the last three months output by the government-owned smelter in Texas City, Tex.

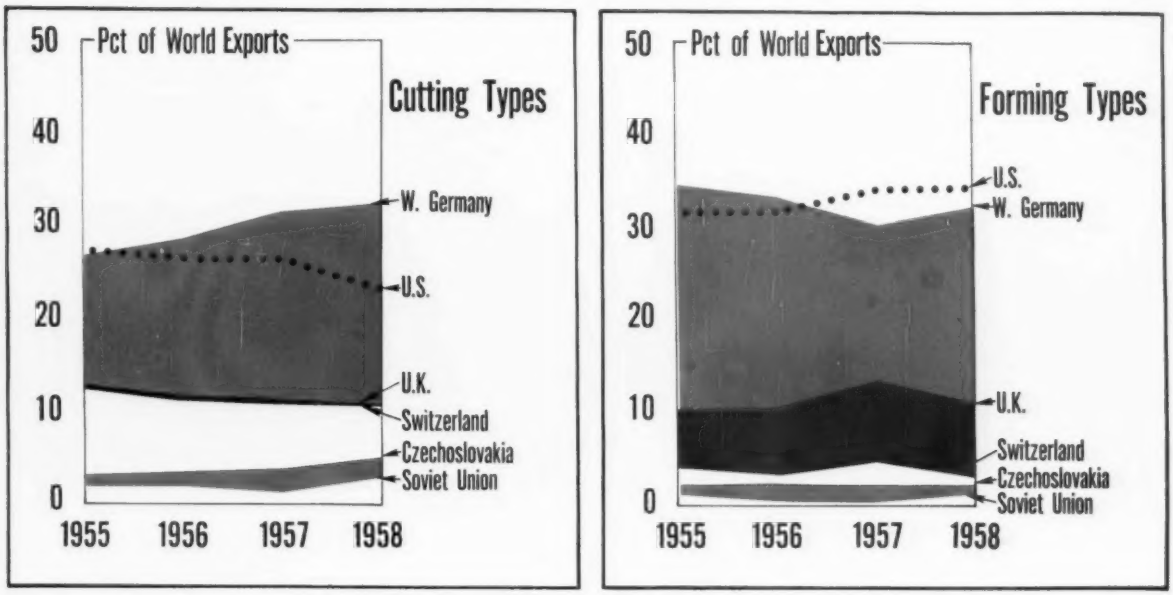
Also, Canada has a 3000 ton stockpile which it intends to move. One source says the Canadian government plans to dispose of this inventory at a rate not more than 300 tons per month. This just about meets Canada's needs and all but takes her off the world market.

Buffer Stock—The buffer stock of the International Tin Council will also be used to hold prices down. At the beginning of the year there were 10,000 tons in this stock. Though some of this inventory has been sold on the London market since last month, it is not known just how much remains.

It's a Steady Rise in Price



How Export Pattern in Machine Tools Varies



U.S. Slips in Tool Export Race

World trade in machine tools increased by a healthy 40 pct between 1955 and 1958.

But despite some increases in sales, U. S. share of the market dropped. Cutting tool exports suffered most.

■ World trade in machine tools rose 40 pct in the period from 1955 to 1958.

But the U. S. share of the world market dropped from 29 pct to 27 pct, despite some increase in sales. Cutting tool exports were the most seriously hurt, with the U. S. market share falling almost 4 pct.

Forming Tools Gain—In contrast, the world market for U. S.-made forming tools increased steadily. All categories of forming tools showed export gains. As a result, by 1959 forming tools made up 44 pct of U. S. machine tool exports, compared with 30 pct in 1955.

These are some of the highlights in a new study on world trade in machine tools, released this week by the Business and Defense Services Administration, U. S. Dept. of Commerce. The survey was made by the Metalworking Equipment Division of the BDSA.

Its aim: To show the volume and trends in world market demand for machine tools, the position of the United States and other world suppliers, and the principal markets for these tools. The data used was derived from the reports of countries which make significant shipments of tools.

Volume Increase—On a worldwide basis this is what the BDSA survey reveals about trade in machine tools:

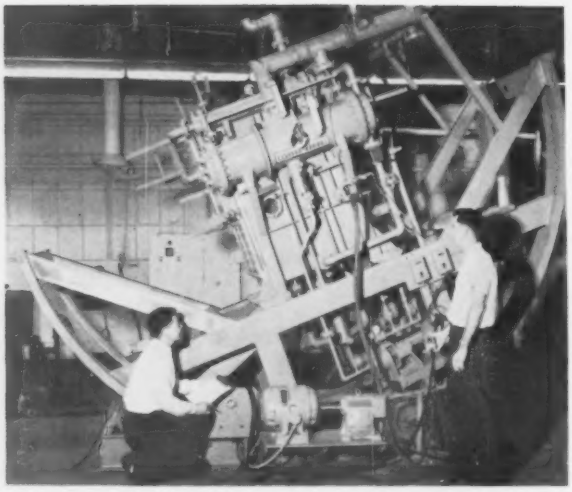
Volume among the principal trading countries advanced from $438 million in 1955 to $614 million in 1958. This increase of 40 pct far exceeded the general rise in the value of world trade in all commodities, which was 13 pct.

West Germany and the United States far outdistanced all other suppliers to the world export market in the 1955-1958 period.

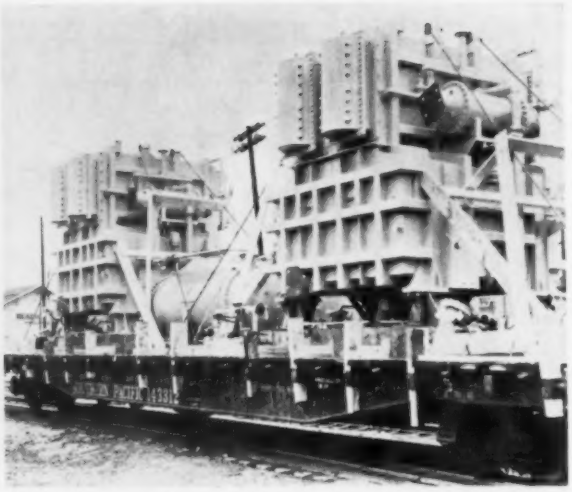
The United Kingdom ranked third, contributing about 12 pct, and Switzerland was fourth with about 9 pct. The remaining 20 pct was supplied (in order of rank) by Czechoslovakia, Italy, France, Sweden, the Soviet Union, Belgium-Luxembourg, the Netherlands, Denmark, and Japan.

Losers and Winners — Who gained and lost in machine tool exports during the four-year span? West Germany, Italy, Sweden, and the Communist countries (Czechoslovakia and the USSR) substantially increased their world market share. But other exporting countries, including the U. S., either showed little change in market position or suffered losses.

Noteworthy was the gain in West Germany shipments between 1955 and 1958. They increased from $128 million to $199 million.



THOROUGH TESTS: All sea water conversion units at Aqua-Chem are thoroughly tested. Here, a 40,000 gallon-a-day evaporator is "rocked and rolled."



NUCLEAR USE: Aqua-Chem, Inc., provided four 70,000 gallons per day flash evaporators for the first nuclear-powered aircraft carrier, the Enterprise.

Water Desalting: Push Is On

Significant gains have already been made in converting salt water to fresh water. And many more are on the horizon.

Cost continues to be the big problem. Companies are fighting it in different ways.
By K. W. Bennett

■ "I have said that if we could ever competitively, at a cheap rate, get fresh water from salt water, that it would be in the long-range interests of humanity which would really dwarf any other scientific accomplishment. I am hopeful we will intensify our efforts in that area."

This is how highly President Kennedy rates salt water conversion. He made these remarks at his first press conference after the Russians put a man into orbit. In noting "exceptional scientific advances" by the U. S., the President concentrated on the salt water conversion theme.

Moving Ahead — There has already been great progress in this field. And new advances are in sight.

The first of four machines scheduled for delivery to Israel is under test at the Beloit, Wis., plant of Fairbanks-Morse & Co. Each unit will turn 60,000 gallons of salt water into fresh water daily.

At New Orleans, Aqua-Chem, Inc., Waukesha, Wis., is installing six saline water purifiers into three cargo ships. It also has four 30,000 gallon-per-day units on order for two U. S. amphibious craft. With over 4000 units built, Aqua-Chem, affiliated with Cleaver Brooks Co., is a pioneer in the field.

Wide Interest—At least 28 U. S. companies are active in the saline water field—in research or building giant plants that will produce 1 million gallons per day.

One company began marketing a washing-machine size saline water converter for seaside homes last year. By last week, six companies were actively studying this market. They'll begin with a home hard water softening unit, then move into sea water conversion for home use.

Govt. Backing—The Office of Saline Water, Dept. of Interior, backed four plants, three of them rated at 1 million gpd, last year (The IRON AGE, May 26, 1960).

One of the biggest, at Freeport, Tex., goes on stream this June. A fifth, at Wrightsville, N. C., will begin producing between 300,000 and 500,000 gpd this year.

In Congressional committees are bills ranging from $20 million government funds for saline conversion research, to $50 million over 10 years. There is also a plan to encourage city governments to go into saline water purification at the local level.

Both President Kennedy and the Secretary of Interior have indicated they'll back saline conversion research.

Nothing New—Saline water conversion isn't an infant. It's been a growing business since the 1940's.

Aqua-Chem has 34 units in U. S. pharmaceutical plants alone, some capable of 50,000 gpd output.

Government sources estimate that overseas salt water conversion plants already purify 30 million gpd. And at least five plants, each of 750,000 to 1 million gpd, are being built.

Price Isn't Right—The real battle is cost.

Estimates put converted sea water costs at $1 per thousand gallons at present. In two years the figure should be down to 50¢. Industry figured it could get the figure down to 50¢ per gallon in 1960, is now betting on 70¢ by 1962.

Cost Estimates — Most company spokesmen are conservative in their estimates of cost reduction.

C. S. MacGowan, director, Office of Saline Water, says, "There are a number of variations of the six or more processes under study. We would like to know more about each variation.

"The only processes of any magnitude now operating produce water at a cost of $1.75 per thousand gallons. We hope the demonstration plants now being built will knock at least 50¢ to 75¢ off this cost figure."

Lower Figure — F. A. Loebel, president, Aqua-Chem, says, "In view of advancing techniques over the past two years I believe it is quite feasible to obtain water with present equipment at a cost of 90¢ per thousand gallons. This would be in a million gpd plant, working with a power plant.

"From data obtained, I'd say that brackish water, which has a lower salt content than sea water, can be purified now at a cost of 70¢ per thousand gallons."

Big Stakes—The stakes, for metalworkers, are impressive.

A 100,000 gpd plant uses eight miles of aluminum tubing, 50 tons of sheet and plate steel. In addition, heat exchange equipment, valving and metering devices, complete control systems, make the units resemble an oil refinery in complexity.

Corrosion is a problem and plastics, stainless steel, aluminum, and vinyl clad carbon steel are in growing use.

With many methods of sea-water conversion possible, there's plenty of room for competitors. Whiting Corp., Westinghouse Electric Corp., General Electric Co., and Aqua-Chem have all researched distillation plants.

Lead and Zinc Outlook Brightens

World tonnage of zinc is expected to rise 15 pct this year. Lead production should climb also.

Domestically, lead and zinc producers say the auto industry is becoming a bigger market.

■ The auto market is becoming bigger and more attractive for lead and zinc producers.

And this year, zinc output is expected to reach its highest world level since 1956. Tonnage should be almost 15 pct higher than last year's 2430 tons.

This was the opinion of lead and zinc men attending the joint conference of the American Zinc Institute and the Lead Industries Assn. in Chicago recently.

Though the increase in American zinc output has been slow in recent years, there are indications that U. S. producers will find rising demand in 1961. American stocks are high; foreign stocks are low.

And, domestically, the auto outlook is good.

Real Importance—To the producer of zinc and lead in this country, the auto market is of vital importance. At least 34 pct of consumed lead goes into storage batteries. Almost 38 pct of U. S. zinc is used for galvanized steel. And automakers are buying more galvanized every year.

Also, zinc die-castings are becoming an important auto item. Of the 10,600 die-casting machines now in use, 6000 are employed in zinc casting. And much of this is aimed at the auto market.

Because of this potential, lead and zinc producers are making large research outlays. Their aim: To diversify their markets.

As other lead and zinc markets grow, so does automotive demand. Storage battery production hit a record peak in 1959; fell off only slightly in 1960. And most of last year's loss was in replacement batteries. Original equipment manufacturers boosted purchases 8 pct in 1960.

Conservative Estimate — Total battery production this year should equal 1960's level, according to C. H. Allen, president, Assn. of American Battery Manufacturers. This is probably a conservative estimate. During the first two months this year, battery sales ran 17 pct ahead of a year ago.

Another good sign for lead and zinc men is the increasing demand by the auto industry for galvanized sheet. J. C. Widman, executive engineer, Ford Motor Co., points out that Ford will use 80,000 tons of galvanized this year. In 1960 Ford used 58,000 tons.

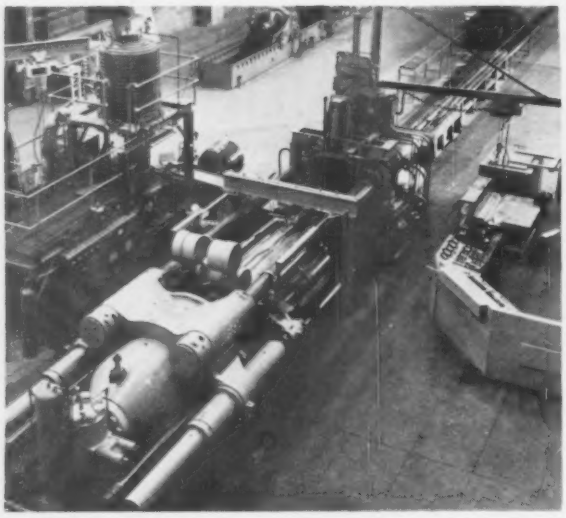
Falcon, for example, has gone from 100 lb to 125 lb.

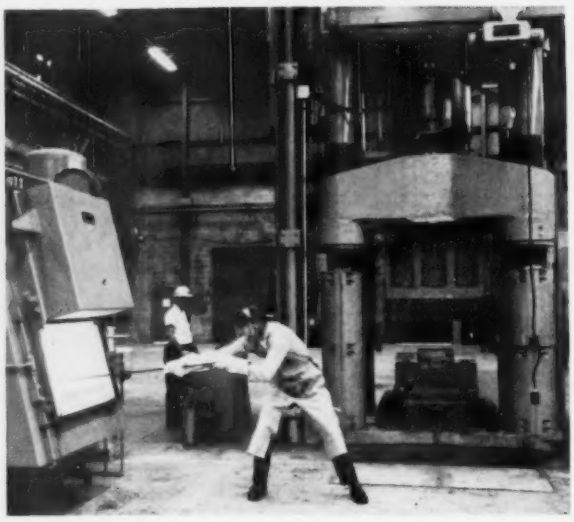
Highway Outlook — Highway construction is also a key market for lead and zinc producers. Highway expenditures in the U. S. should hit $7 billion in 1961. By rule-of-thumb, each $1 million represents 185 tons of structural steel, 190 tons of rebar, 36 tons of corrugated pipe, and 50 tons of miscellaneous steel.

Another rule-of-thumb: For every dollar of Gross National Product, motor vehicles will travel 1.5 miles. Federal dollars represent 40 pct of total highway expenditures in 1960. That's a record high.

But unless Congress moves quickly, money to bolster the fading pay-as-you-go highway program will shrink. There's only $1.9 billion in reserve now. And $2.4 billion is needed if the program is to stay on schedule.

New Metals Center Will Turn Out Columbium Products





RAPID FORGING: At the new Du Pont Metals Center in Baltimore, this 2000-ton high-speed forge press and argon muffle furnace provide for rapid forging of refractory metals. At the right, a 2500-ton extrusion press is a feature of the Center, where production of mill products of metal and alloys has begun.

Midwest Steelmakers Start Big Projects

Last week saw major moves forward by Midwest steelmakers.

Bliss & Laughlin, Inc., the nation's biggest unintegrated cold car producer, announced it is building a $2 million, 25,000 ton-per-year plant at Medina, O.

Youngstown Sheet & Tube Co. is building a new six-stand cold reduction mill at Chicago.

And A. Finkl & Sons Co. in Chicago unveiled its system for argon teeming of vacuum degassed steel.

More Capacity—The new plant will raise Bliss & Laughlin capacity to 575,000 tons of cold-drawn bar per year. It also moves the company into a state that is the third major cold-drawn bar consuming area in the U. S.

Metal Output—As finished steel capacity advanced in the Midwest, so also did hot metal output. Granite City Steel Co., St. Louis, began operating a new blast furnace two weeks ago. First steel was poured from a new 600-ton open hearth furnace last week.

Tin-Plate Entry—Youngstown's new mill puts the company into the thin tin plate market in the Midwest for the first time.

At 7250 fpm, the mill will be the biggest and fastest sheet mill in the industry. It is starting initial commercial production and will produce coils up to 80-in. in diameter.

Electric Furnace—The Finkl system uses electric furnace steel in its new argon teeming system. A ladle full of the steel is placed in a vacuum chamber. Gases trapped in the molten metal are removed under vacuum.

The degassed steel is then teemed into ingots through an inert gas. Steel made in this way can boost the life of hot die forgings 25 pct. Ingots over 17 tons weight are produced regularly.

Kaiser Sues J&L For LD Process Royalties

Neither party is talking in the royalty suit of Henry J. Kaiser Co. against Jones and Laughlin Steel Corp.

The suit, filed in a District Court in Cleveland, seeks to collect royalty installments on two basic oxygen vessels at the Aliquippa Works of J. & L. The vessels are of the LD type, to which Kaiser claims American rights. Kaiser says annual installments are owed since 1958.

The suit is surprising on two counts. First, the amount of the total royalty payment is more than $700,000, according to Kaiser. Secondly, it was believed J. & L. payments were contingent on court actions involving Kaiser and McLouth Steel Corp.

Court actions of Kaiser and McLouth have been hanging fire more than three years. They involve the validity of Kaiser's patents and the application of these to McLouth.

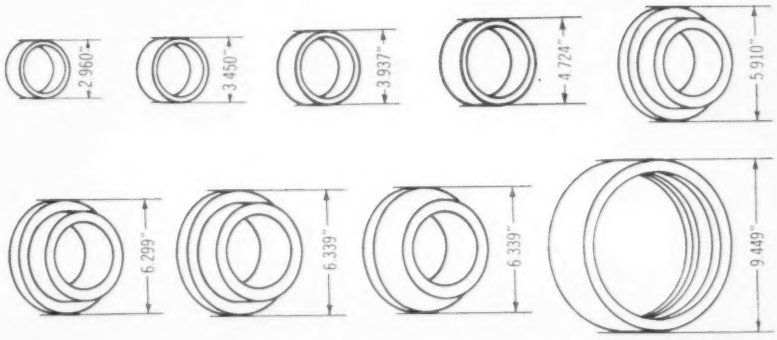
McKay Machine Starts $4.5 Million Expansion

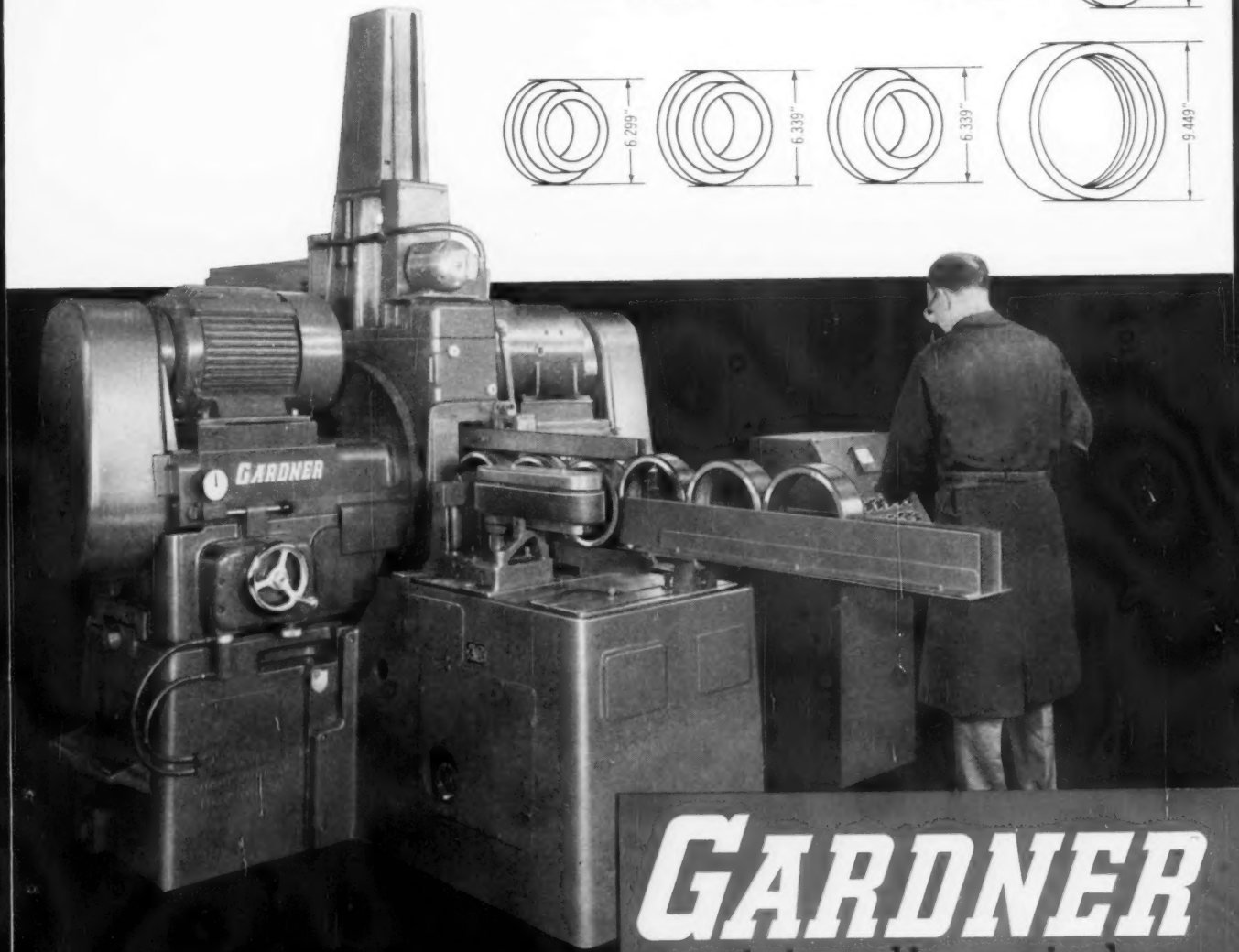
McKay Machine Co. will build a new plant and three-story general office building this year. It is planned for a 34.5-acre site near Youngstown.

The machine shop and assembly plant will cover 145,000 sq ft. With improvements at McKay plants in Warren, O., and Danville, Ill., expansion programs in 1961 will cost $4.5 million.

DISC GRINDS 9 DIFFERENT BEARING RACES

tooling on 2H30 handles bearing races from 2.9″ to 9.4″ diameter





Gardner 2H30 Precision Double Spindle Disc Grinder with feed thru fixturing.

grinds two sides parallel in one operation

GARDNER

precision disc grinders

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INDUSTRIAL BRIEFS

Welding Choice—Alfred F. Chouinard has been elected president of the American Welding Society. He is director of research and development, National Cylinder Gas Div., Chemetron Corp.

United Method—Booz, Allen & Hamilton has formed Booz, Allen Methods Service, Inc., industrial engineering consultants. The corporation is opening offices in New York, Chicago and Los Angeles.

All Together—Federal Machine & Welder Co., Warren, O., will merge completely with its parent company, McKay Machine Co., Youngstown. It will be known as Federal-Warco Div. of McKay.

Die Buy—M. D. & L. Co., Inc., Cleveland, has purchased the Die Supply Div., E. W. Bliss Co. The new company will be known as Die Supply Corp. It will make and market die sets and other die makers' supplies.

Extra Weight—CompuDyne Corp., Hatboro, Pa., has acquired TransWeigh Co., King of Prussia, Pa., and Automatic Measurement Corp., Phoenixville, Pa. Both electronic automated weighing companies will function with Weighing & Controls, Inc., a CompuDyne subsidiary.

Air Merger — Southern Oxygen Co., Bladensburg, Md., is merging with Air Products, Inc., Allentown, Pa. Air Products is now completing a $35 million plant expansion program. Southern Oxygen will operate as a division of Air Products.

Dynamic Deal—Dynamic Gear Co., Inc., Amityville, N. Y., has purchased Gear Products & Manufacturing Co., Syosset, N. Y.

Two-in-One — Northrop Corp., Beverly Hills, Calif., is acquiring Arcadia Metal Products, Fullerton, Calif. It will be merged with Acme Metal Molding Co., a Northrop subsidiary in the architectural metal products field.

Alcoa Sale — Stauffer Chemical Co. has purchased special fluorides-producing facilities of Aluminum Co. of America at East St. Louis, Ill. Stauffer produces industrial and agricultural chemicals.

New Parent—American Saw & Tool Co. has formed a new corporation, Vermont American Corp. With headquarters in Louisville, it will serve as parent company to American Saw and its divisions, Vermont Tap & Die Co.; Multi Metals, Inc.; Deluxe Saw & Tool Co.; Vermont-Pacific; and Threadit.

Full Control—Shinn Industries, Inc., Santa Ana, Calif., has been formed and all stock of Universal Ecsco, Inc., Downey, Calif., and Shinn Engineering, Inc., has been acquired. Shinn Engineering fabricates aircraft and missile components.

Bendix Adds—Bendix Foundries Div., Bendix Corp., is acquiring land, buildings and equipment it has rented from the U. S. Government, at Teterboro, N. J. It will continue to produce magnesium sand and nonferrous die castings.

Better Coverage—Columbia Steel & Shafting Co., Pittsburgh, and its Summerill Tubing Co. divisions is expanding the company's total market coverage. Expansion includes a new eastern district sales office in Philadelphia to handle cold-finished bars, new salesmen in the Cleveland and Chicago offices, and a new West Coast sales office.

"If you don't feel well, why don't you go home, and . . ."

Spreading Out—Bancroft-Hickey Manufacturing Co., Bristol, Pa., recently acquired subsidiary of American Chain & Cable Co., has purchased Victor, Inc., of Paoli, Pa. Victor manufactures diamond blades and masonry saws.

New Division—Powertron Ultrasonics Corp., Garden City, N. Y., has formed a new division, Powertron New England, with headquarters in West Springfield, Mass. It will supply cleansers and processing equipment.

Better Service—Soule' Steel Co., San Francisco, has formed five product sales divisions to improve customer service. They include reinforcing products, steel structures, architectural aluminum products, commodity products and Mosaica.

Aluminum Team — Kaiser Aluminum & Chemical Sales, Inc., has formed a special "aluminum consulting team" program. It will provide technical, production and marketing assistance for foundries.

Plant Closes—Cullman Products Corp. has closed the John Lees plant in Muncie, Ind. John Lees Moulding production will now be centered in the Cullman, Ala., plant.

Better Annealing—Facilities were expanded at the alloy plant of Riverside-Alloy Metal Div., H. K. Porter Co., Inc., with a new completely automatic furnace. It will be used for monel and nickel redraw rod.

Extra Service — Consolidated Metal Products, Inc., has opened a new warehouse center in Hemet, Calif., to extend aluminum distribution to mobile home manufacturers.

Custom Finish—Almgard Metal Finishers, Inc., has completed new facilities at Marietta, O. They will permit production of both anodized and textured surface treatments for aluminum and high quality painted finishes for other metals.

Pressing Ahead—Press Automation Systems, Inc., has moved into expanded facilities in Detroit, a 25,000 sq ft plant.

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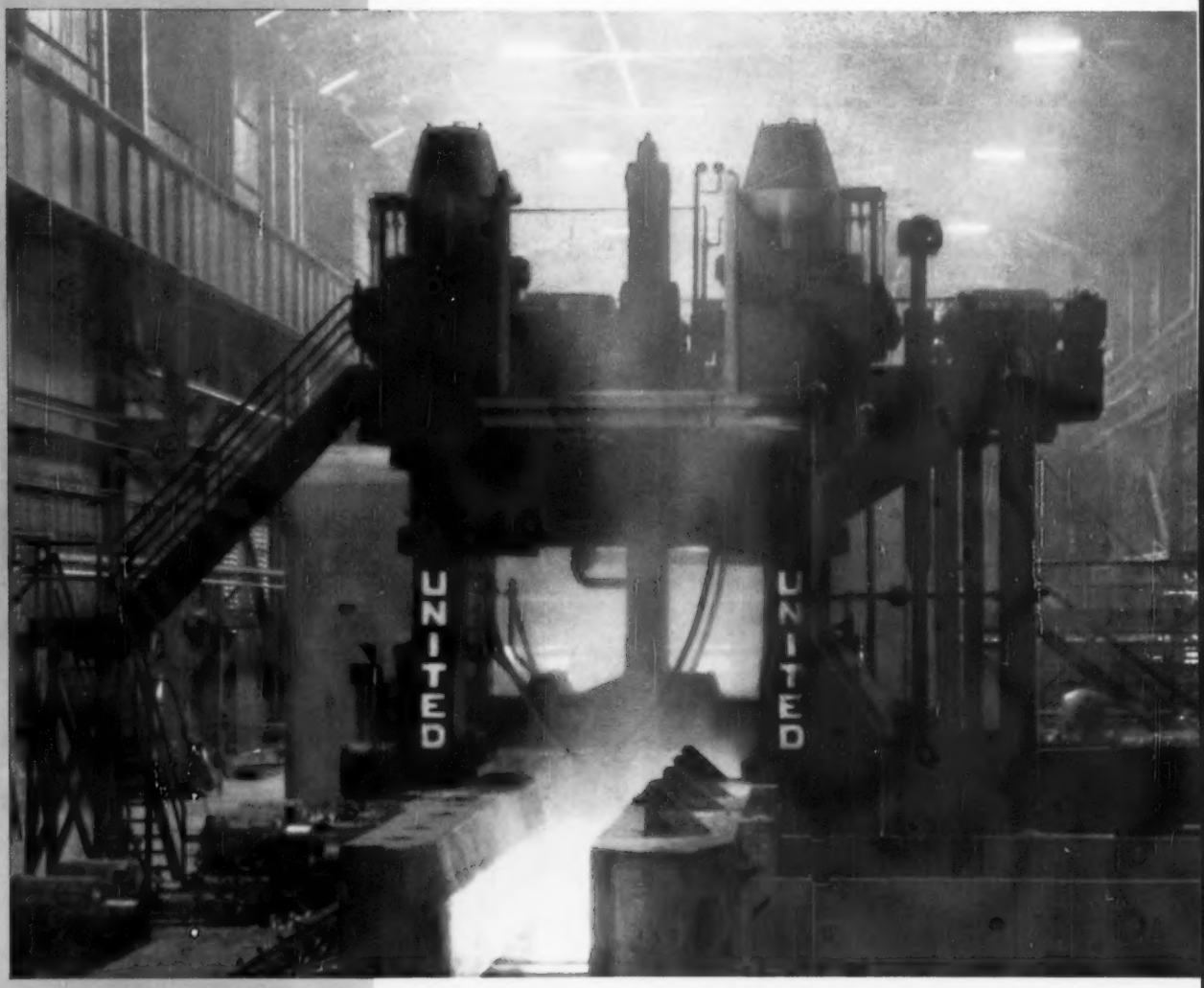

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

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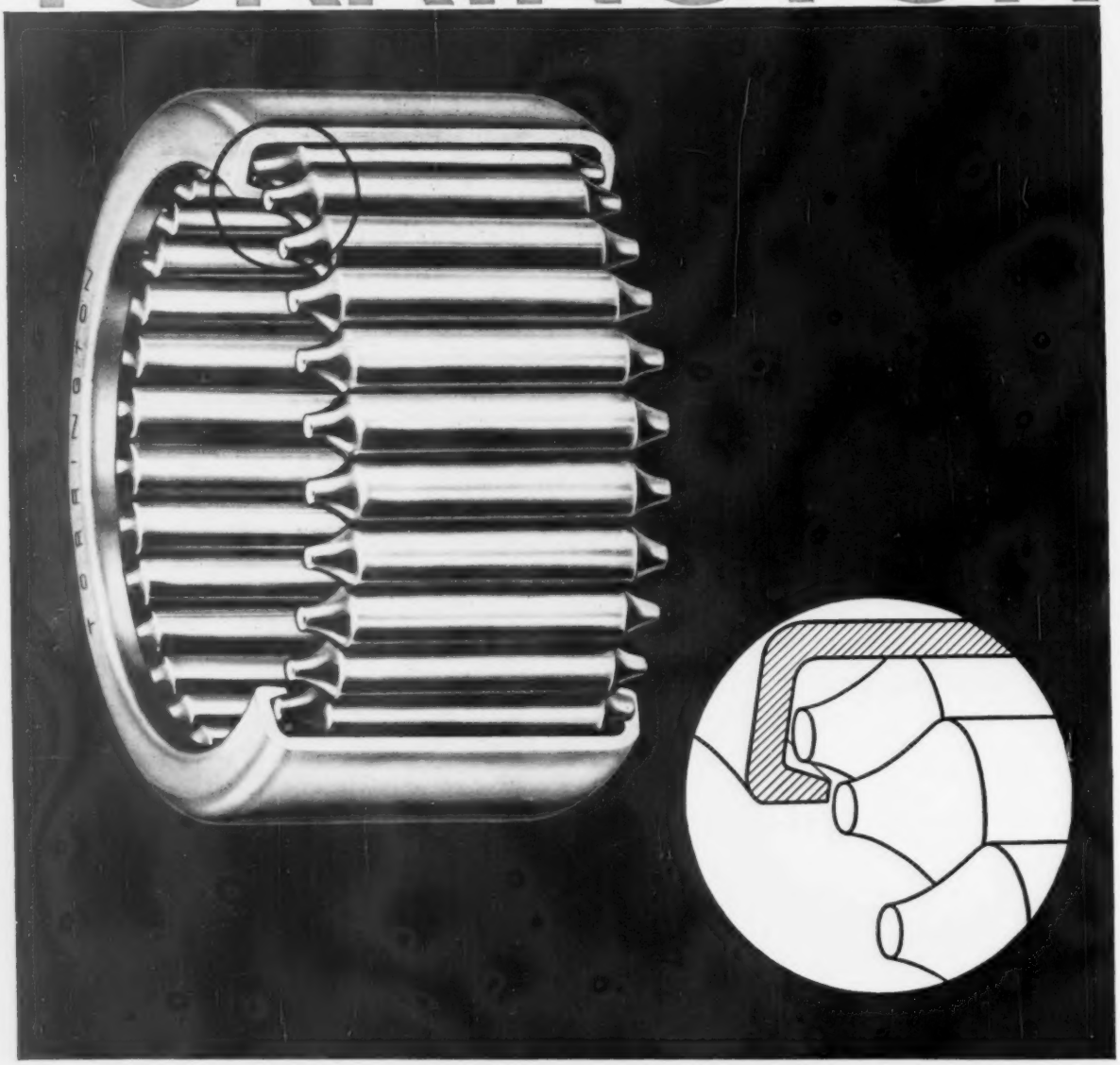

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Tax Favors for Training Costs?

Is money spent to improve employees in the same class as funds spent to improve plants and equipment?

Dr. George Odiorne thinks it is and argues for better tax treatment on investments in human capital.

■ Your company can depreciate the cost of equipment bought to improve or expand production. Why not similar allowances on money spent to train and improve your work force?

This suggestion comes from Dr. George S. Odiorne, director of the University of Michigan's Bureau of Industrial Relations. He told last week's conference of the American Society of Training Directors in Philadelphia, "Perhaps one of the needs of business in the future will be setting aside allowances for depreciation of human skills due to obsolescence, technological change, new products, turnover, or other losses of skill.

"More favorable tax treatment of investment in human capital is needed if the training job is to be done."

Investment Areas—In his talk Dr. Odiorne outlined an economic theory of training—stressing training's value in economic growth, profit, and corporate survival. He noted on-the-job training is not the only area where money is invested in human capital. Others include: Health services, formal educational systems, adult education programs outside industry, and migration of families and individuals.

From the viewpoint of the training director and the personnel manager, all of these are important, Dr. Odiorne points out. But many training directors are apparently unaware that many of the things they do are additions to the company's capital.

Investment or Expense?—Training expenses in a profit making concern, he says, are always carried as an item of expense consumed during the accounting period when the training takes place. There's no attempt to justify training on the return on its investment over its entire life.

How can a company do a better job of relating training to profit? These suggestions are advanced:

Training budgets can be divided into expense budgets and capital budgets. Expenses for job training by foremen, safety training, or work simplification could be charged directly to current operations.

Other forms of training (instructing understudies for people on vacations, backstopping absentees, etc.) are additions to working capital, not capital investments.

Finally, there is training in the same category as replacements or additions to plant capacity. This would include programs to rotate junior executives preparing for key jobs, upgrading worker skills, and executive development courses. This includes any training, in fact, for which there can't be an immediate cash turnover, but from which ultimate gain will result.

Handling Long-Range Funds

■ Even after a training director classifies programs along these lines, there are problems in handling the long-range part of the budget, Dr. Odiorne warns.

How Much and Where?—Training directors should be ready to give management the answers to these questions:

(1) How much money will we need to spend on long-range human investment in a given budget? Alternate ideas must be considered. Do we send three executives to development schools or rotate six others?

(2) Where will we get the funds for this investment? It's in this area that Dr. Odiorne suggests the prospect of tax depreciation allowances on investments made in human capital.

Rationing and Timing—(3) How will training expenses be rationed? If handled realistically, training investment will run into the same problems faced by conventional capital investment. Alternate uses of investment capital among places where it might be spent is a matter of business strategy.

(4) How will timing be arranged? "Timing of investment is something about which training directors know little," says Dr. Odiorne. "But top managers often know little more. If general managers are to learn about investment in human capital, it must be the directors who educate them."

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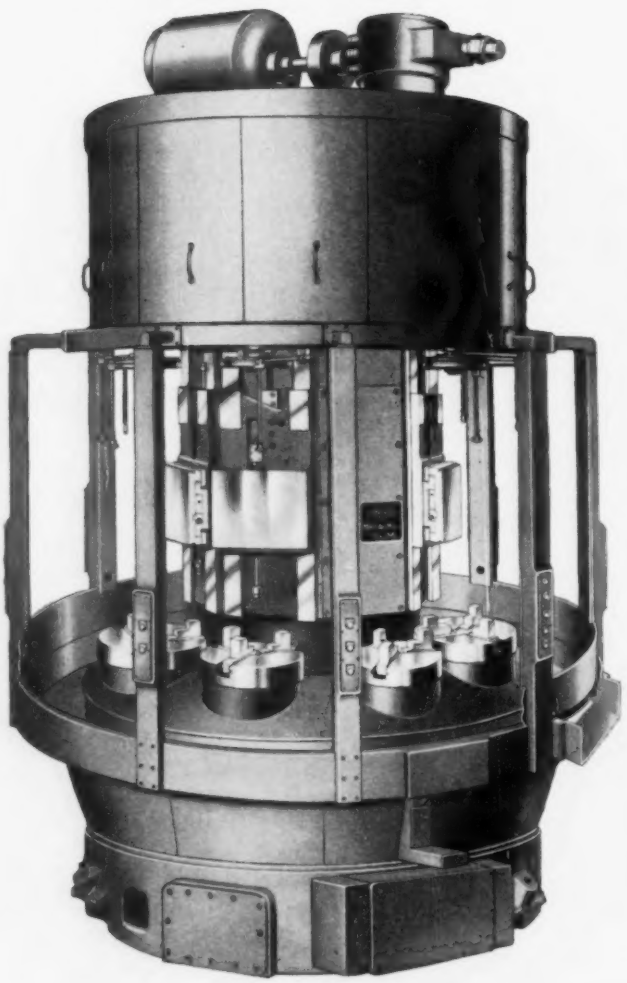

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Sports Car Trend Shapes Up

Automakers Will Face Problems in Meeting Competition

There's a new trend taking shape in Detroit. Automakers say the customers now want sport-styled cars.

To meet this market, producers will have new problems and expenses.

By A. E. Fleming

■ A sporty new version of the Valiant is taking shape in the styling studios of Chrysler Corp.

Chrysler hopes the changes, complete with bucket seats, will keep the Valiant in competition with similarly spruced-up models of the Corvair, Falcon, Comet, Special, Tempest and F-85.

In recent months, several major automakers added "high performance" models to their lines. And more are on the way along with such newcomers as convertible compacts.

New Trend—Apparently a new sport car trend is developing. How far it will go is still the big question in Detroit.

"But it will stretch farther into a greater multiplicity of models," predicts R. M. Rodger, in charge of engineering and product planning for Chrysler's Chrysler - Imperial Div.

"When a car like the Monza explodes in popularity, everyone must be set to get into the act quickly. The sports-type car trend is ready to move. It's great for the car buyer because he has more models to choose from; he can practically pick his own individual car. And it adds zest to the market."

More Problems—But there will be problems too. Stylists, engineers, production planners and purchasing agents will be faced with heavier workloads. And there will be increased manufacturing complexity.

Today it takes at least 30 months to move a new model from the drawing board to the assembly line. A special adaptation of a model can be fashioned in less than one year. But this is still a long time and automakers want to shorten it.

"Broadly speaking," says Mr. Rodger, "the need to move into production quickly, to keep pace with public taste and demand, means we must come up with a way to get simpler and fewer tools to make cars. We're going to need newer, different, and simpler body shapes and structural parts that are more easily adaptable to change. And this can create cheaper, short lead-time tooling."

Optional Cuts—He says optional equipment is an area where cutting may occur. "Options add to the problem of the manufacturer and the dealer. This is especially so in low-volume sports car types. We're taking a serious look at our optional offerings. They're profitable, but not always profitable enough to justify the confusion they cause."

Bumpers: Aluminum vs Steel

There's real competition brewing between steel and aluminum producers for the car bumper market. All cars now use steel for bumpers. But automakers are taking a close look at aluminum.

The main drawback so far for aluminum has been cost.

Last fall, Chrysler Corp. ordered 10,000 aluminum bumpers from Reynolds Metal Co. for Valiant models. But the original price estimate fell far short of actual cost and the order was cancelled. At that time, M. F. Garwood, chief engineer at Chrysler's materials section, told The IRON AGE the aluminum bumper was many years away as far as Chrysler was concerned.

But Now — However, General Motors Corp. seems to be taking up the study. Buick has been testing aluminum bumpers for the rear end. And now it is said to be asking for price quotations on aluminum bumpers.

Pontiac tested Kaiser bumpers for almost a year. It put them through a series of corrosion tests during the past winter.

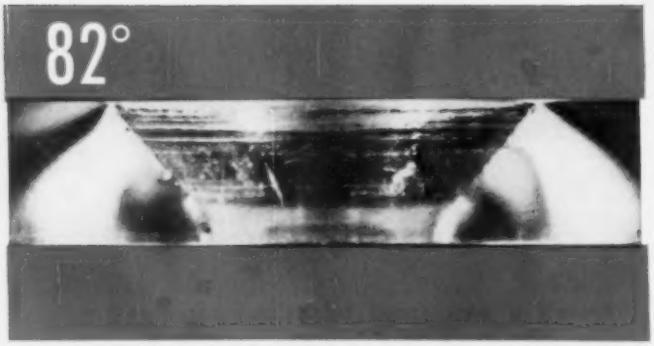
And there are those who wouldn't be surprised if Buick-Oldsmobile-Pontiac came out with at least some aluminum bumpers on the 1962 compacts.

One source tells The IRON AGE Kaiser will furnish 5000 Pontiac bumpers for the 1962 model year. In return for using Kaiser aluminum, Pontiac will reportedly get $1 million in tie-in advertising.

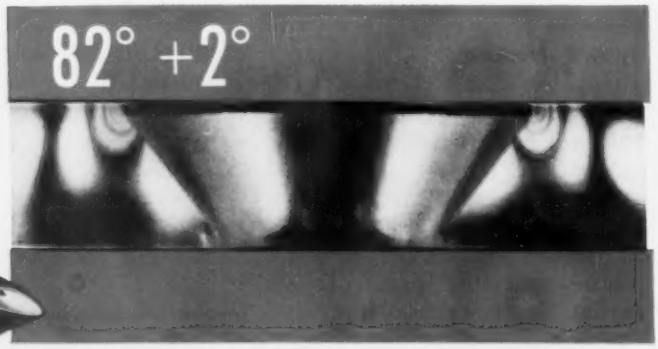
Fire With Fire — To meet the threat, Great Lakes Steel Corp. has initiated a series of Detroit radio commercials sharply pointing out that steel bumpers are stronger and better than aluminum ones. The word "aluminum" is used.

PQA* proves it...

this Allen Flat Head Cap Screw has complete all-around head contact

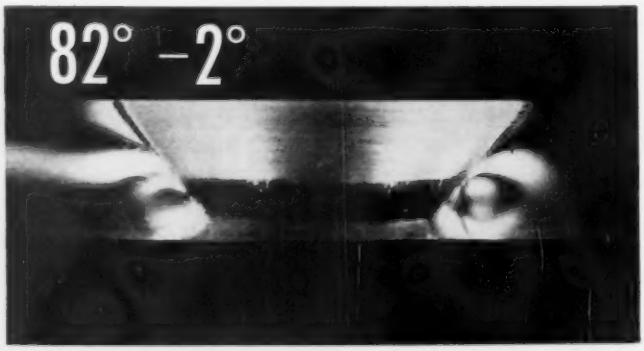


PQA makes it certain that an Allen Flat Head Cap Screw has contact throughout the angle of the head with the mating countersunk hole. This assures the strongest possible fastening. In this photo, made with polarized light, you can see the stress points throughout the chamfer.



Industry standards allow a tolerance of +2° in the head angle. Allen Flat Heads manufactured to this tolerance have greater bearing at the top of the head—shown by the stress patterns in this polarized light photograph.

*PRODUCT QUALITY ASSURANCE



Industry also allows a tolerance of −2° in the head angle. *But Allen does not utilize this negative tolerance.* The reason—it is entirely possible to have head seating efficiency reduced because of excessive interference in the head-shank area. The photo shows high bearing stress in this area—with risk of breaking prematurely.

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Building Paces Steel Upswing

Signs Point to Continued West Coast Gains

Steelmakers agree the upturn has reached the West Coast.

Building is boosting purchases and service centers report more deliveries. Officials expect the boom to continue.
By R. R. Kay

▪ Steelmakers say the business upswing has reached the West Coast. And they expect it to continue.

"Definite improvement in the past 45 days" is reported by Stewart S. Cort, new vice president of Bethlehem Steel Co.'s Pacific Coast Div. He predicts the upswing will continue through the third and fourth quarters.

Building Boom — Construction has played a big role in the West Coast upturn.

Jack L. Ashby, president, Kaiser Steel Corp., says general building is stronger than was expected. He sees more steel going into missile bases, "with fewer, but larger, projects starting."

Demand has climbed steadily in recent weeks, says Mr. Ashby. Kaiser showed a profit in March, first month since June, 1960.

Looking Ahead—J. D. McCall, president, Columbia - Geneva Div., U. S. Steel Corp., also rates building demand as a big factor in improved steel business. And he is optimistic about the future.

Eyeing the 1966-70 period, he says, "We expect annual western steel consumption to increase 18 pct, compared with the 1957-59 average. In tonnage, this means a growth from 6.7 million tons to 8 million."

Varied Demand — The building upswing and increased service center purchases have boosted demand for a wide variety of products.

Estimates of second quarter shipments of standard structurals, plates, bars and sheets in West Coast markets indicate a 25 pct gain over 1960's final quarter. This will mean a 16 pct jump over this year's first quarter.

Second quarter shipments are expected to total 670,000 tons.

Foreign Products—Foreign competition still plagues the West Coast industry, though. Almost 90 pct of the nails now used in California are made abroad.

More than half of the butt-weld pipe is foreign. Over 40 pct of the wire rod and almost all barbed wire are made in foreign mills.

Major Problem—Mr. Cort feels other materials are also challenging West Coast steelmakers.

The newly elected vice president has spent 20 of his 24 years with Bethlehem in the western division. A year ago he was named assistant general manager, sales, at the company's Bethlehem, Pa., headquarters. He took over the West Coast top spot on May 1.

His promotion suggests Bethlehem now is stressing sales and commercial research.

"These are the most pressing problems facing the industry," Mr. Cort concedes. He doesn't discount competition among steel companies, but feels other materials "pose a serious problem."

Bridge Work—Pointing up the California building boom is an $11.373 million contract awarded by the state last week to Kaiser.

Mr. Ashby notes California is spending $633 million this year on highway and bridges, 10 pct above the 1960-61 outlay. The Kaiser contract is to fabricate and erect the superstructure of the San Pedro-Terminal Island Toll Bridge.

CORT: "Definite improvement."

Work Starts — Steel fabrication will begin at once at Kaiser's Montebello plant.

The bridge will require 10,000 tons of structural steel and is scheduled to be ready in 1963. The four-lane structure will be 6000 ft long with a 1500-ft suspension span.

It will be the first bridge of its kind in southern California, and the third biggest in the state.

Peak Here—Another West Coast executive feels differently about the steel industry's business cycle this year. He thinks the peak is here.

"We are experiencing a considerable improvement in business," he says. "And there is every indication the current quarter will be a 1961 peak for us."

This executive says customer inventories "are down to comfortable levels." He expects shipments to remain strong through the third quarter. But he thinks the final quarter will see a dropoff.

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MACHINE . . . 1"-6 Automatic Bar Machine Air-Feed — Feedout on index and in 3rd position during machine cycle.
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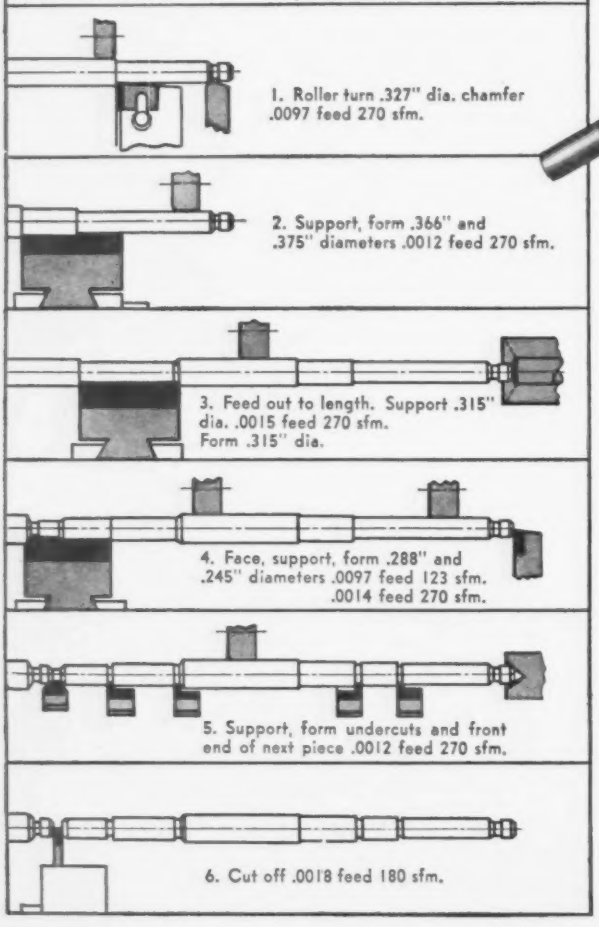
STOCK SIZE . . . 13/32" rd.

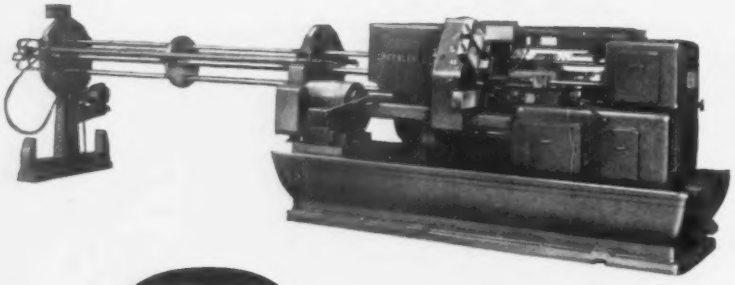
TOOL SLIDE STROKE . . 1-9/16" at .0097" feed.
SPINDLE SPEED . . . 2540 rpm 270 sfm.
MACHINE TIME . . . 5.8 seconds.
ESTIMATED GROSS PRODUCTION . . . 620 per hour


1. Roller turn .327" dia. chamfer .0097 feed 270 sfm.
2. Support, form .366" and .375" diameters .0012 feed 270 sfm.
3. Feed out to length. Support .315" dia. .0015 feed 270 sfm. Form .315" dia.
4. Face, support, form .288" and .245" diameters .0097 feed 123 sfm. .0014 feed 270 sfm.
5. Support, form undercuts and front end of next piece .0012 feed 270 sfm.
6. Cut off .0018 feed 180 sfm.

1. Eliminate stock pushers . . .
2. Eliminate scoring of stock . . .
3. Reduce downtime during set-up . . .
4. Provide extra length feed-out . . .

The part is a 6-7/8" long armature shaft used in the "Electrolux" vacuum cleaner. It demonstrates how effectively Greenlee Air-Feed Automatics and carbide tooling can team-up to increase production and reduce costs. The shaft is machined from 13/32" S.A.E. 1137 steel at a gross production rate of 620 pieces per hour. Recommended cutting speed for high speed tooling is 120 sfm. The rate was boosted to 270 sfm with carbide-tipped tooling. Sequence of operations is shown at the left.

Note how the stock is partially fed out on the index and to its full length in the third position. This provides for the most effective tooling arrangement. Greenlee Air-Feed Automatics permit greater job versatility and assure added profits. See your Greenlee representative or send us a print of your high-cost problem-part.



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Labor Costs Force Automation

But Automation Brings Penalties as Well as Profits

Industry looks to machines when labor is expensive, engineers are told by economist.

Result: "Technological adjustment" is big and growing problem in industry.
By R. H. Eshelman

■ "In a certain sense, unions have been the efficiency experts in the United States. By raising labor rates, they have forced a greater degree of mechanization and technological change. When labor becomes too expensive, we seek ways and means of doing with less of it."

The speaker was Dr. William Haber, University of Michigan economist, and a highly-regarded expert on unemployment problems. He was one of three speakers at the recent 25th anniversary meeting of the Engineering Society of Detroit.

Other speakers were, Thomas Roumell, director of the 7th region National Labor Relations Board, and Roblee Martin, president of Dundee Cement Co. Mr. Martin is also chairman of the executive committee of the new "industrial ambassadors" group of Michigan.

Problems Cited — Their theme: The human and economic problems of sweeping technological advances.

Dr. Haber, from his sheer economic view, turned to the human side. He stated the problem as one of "technological adjustment." It's a very nice word for those not involved, he pointed out, but "an unadulterated tragedy for persons directly involved."

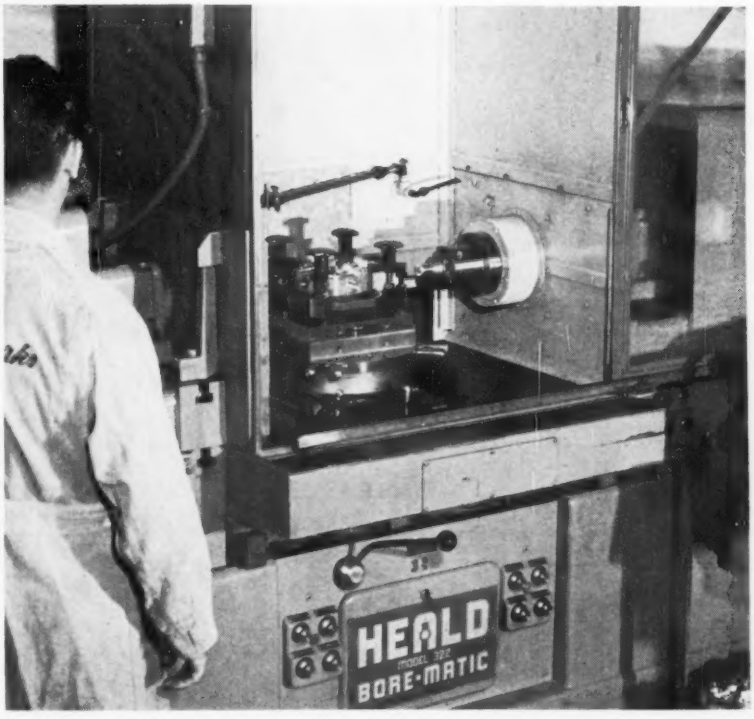
Dr. Haber warned that in the future "the rate of technological change is likely to be accelerated." He sees pressure for it from several sources: Overseas competition, increasing labor rates and fringe benefits.

Many Aspects—In this view, automation is merely one of several types of technological change going on in industry that affects production costs, efficiency and jobs.

Mr. Roumel called for an end to the drive for continued increases in the elements that go to make up the "wage cost factor," in production. He said these elements must level off so that the economy as a whole and the average American "can hope to enjoy the fruits and benefits of steady employment."

Roblee Martin represented a viewpoint of practicing management. He sees hope in research to solve the problems of the technological race. He urged cooperative effort between research people in education and the government with industry. This is needed, he stated, to "develop a new prosperity, utilizing economic and technological assets to the fullest."

Assets Used — Mr. Martin has met and solved many of the problems he talks about at his own company. The company is highly automated and rates high in labor efficiency. But it also rates high in labor cooperation and job security.



MISSILE PRECISION: Operator checks setup for semi-finish and finish bore of four radial bores offset from centerline in Sparrow III missile hub assembly. Opposite bores must be in line within 0.022 in. Heald Machine Co. is maker of this Bore-Matic used at Stacy Machine Works.

HARRIS CS-750

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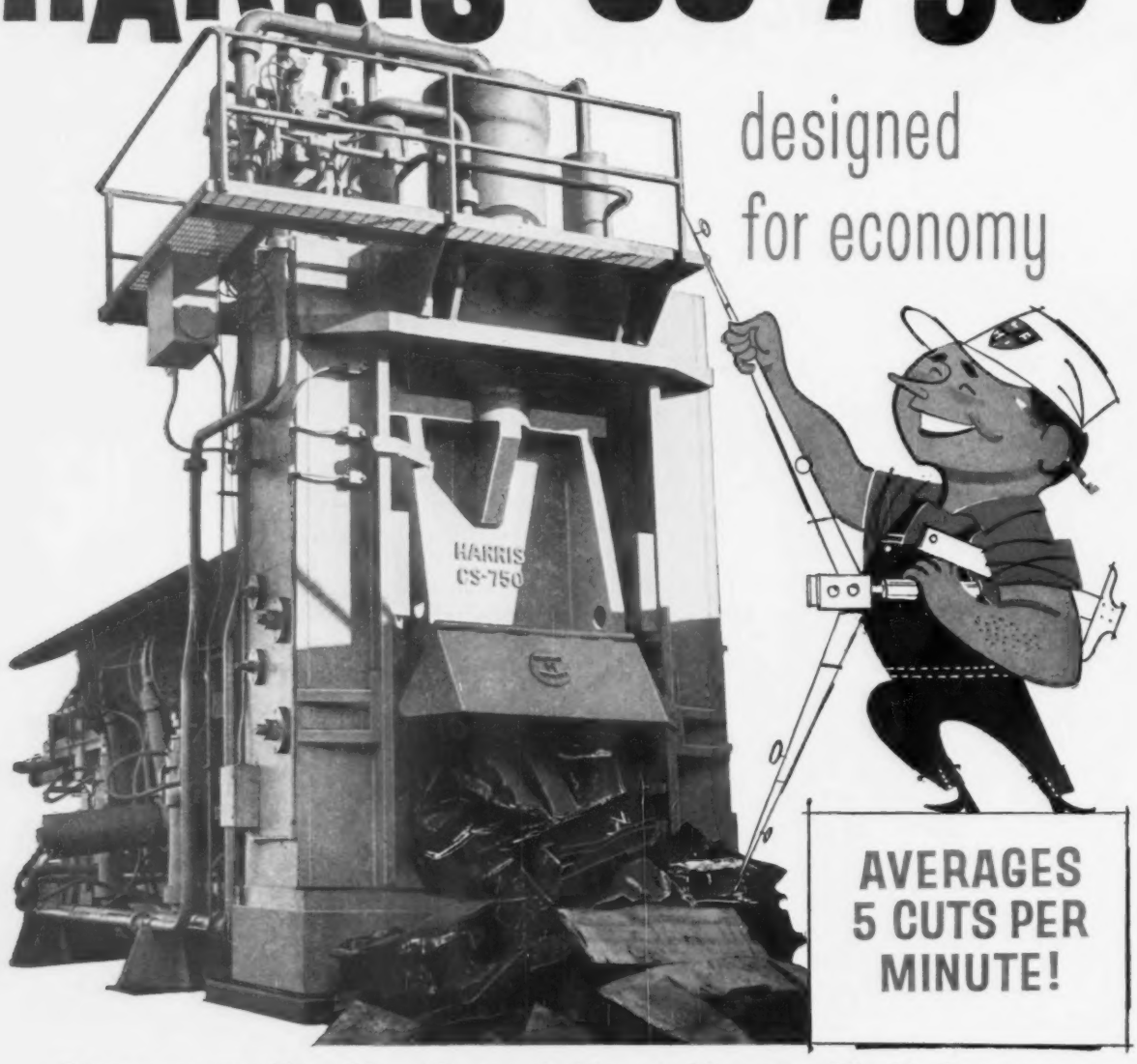

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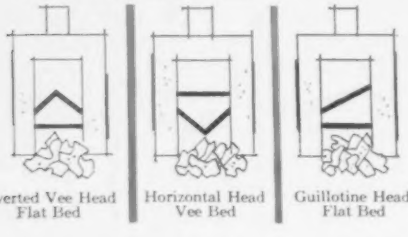

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W. R. Breeler, named president, Allegheny Ludlum International, S. A., headquarters in Geneva, Switzerland, effective July 1.

Kennecott Copper Corp.—**F. R. Milliken,** elected president.

Allied Chemical Corp.—**H. E. Imes,** appointed president, Semet-Solvay Div.

Bailey Meter Co.—**H. H. Gorrie,** elected executive vice president; **L. F. Richardson,** elected vice president, sales, and a member of the board of directors; **J. H. Dennis,** elected vice president, manufacturing.

Fort Pitt Bridge Works—**T. A. Straub, Jr.,** elected president.

Minneapolis-Honeywell Regulator Co.—**J. B. Moxness,** appointed manager, pyrometer supplies, Brown Instruments Div.

Kansas City Structural Steel Co.—**J. S. Harrow,** elected vice president; **T. M. Fitch,** elected to the board of directors.

Aluminium, Ltd.,—**M. P. Weigel,** appointed vice president.

Hancock Telecontrol Corp.—**W. E. Bacon,** named administrative assistant to the president.

Heald Machine Co. — **A. F. Townsend,** named vice president, manager of Grinding Machine Div.; **A. A. Arbogast,** named manager, Bore-Matic Machine Div.; **E. J. Keyes,** named vice president, manufacturing.

Aluminum Co. of America—**F. M. Gring,** elected asst. treasurer.

Chrysler Corp. — **Frank Walter,** appointed director, product planning, and chief engineer, Plymouth Div.

Great Lakes Steel Corp.—**R. S. Miltenberger,** appointed manager, technical development.

Crucible Steel Co. of America—**B. O. Young,** appointed manager, Carbon and Alloy Specialties Product Div.

A. H. Hanks, named general manager, bar, wire and tube production, Allegheny Ludlum Steel Corp.

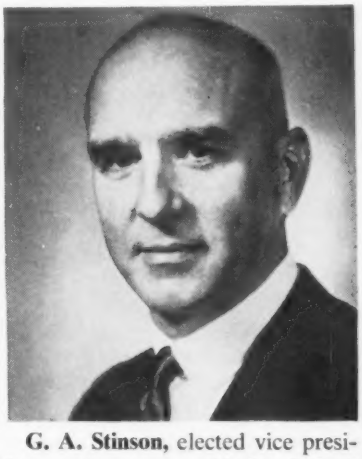
Wheeling Steel Corp. — **W. A. Steele,** elected chairman and president; **P. W. Koenemund,** elected vice president, operations; **F. A. McClelland,** elected vice president, sales.

Bridgeport Brass Co.—**D. C. Bell,** named vice president, finance; **R. L. Allen,** named vice president, marketing.

(Continued on P. 98)

L. C. Rose, elected executive vice president, Colorado Fuel & Iron Corp.

Rudolph Smith, elected executive vice president, operations, Colorado Fuel & Iron Corp.



G. A. Stinson, elected vice president and secretary, National Steel Corp.

(Continued from P. 97)

Republic Steel Corp. — **K. R. Henry,** appointed sales representative, Baltimore Branch; **Harry Geiselman,** named asst. superintendent, Mechanical Dept.

Bijur Lubricating Corp.—**W. E. Durnan,** named executive vice president.

Deere & Co.—**L. D. Wilson** and **Joseph Dain, Jr.,** elected vice presidents.

A. B. Murray Co., Inc.—**A. B. Murray, Jr.,** appointed executive vice president; **W. J. Cornelius,** appointed vice president, operations; **G. H. Root,** appointed vice president, sales; **R. S. Jones,** appointed general manager, products; **R. J. Johnson,** appointed manager, warehouse operations.

Famco Machine Co.—**L. G. Enroth,** appointed general sales manager; **C. G. Mattusch,** appointed asst. sales manager.

H. P. Eells, Jr., elected chairman and chief executive officer, Basic, Inc.

Fairbanks, Morse & Co.—**A. L. West,** named vice president and group executive; **C. E. Clausen,** named vice president, production; **H. E. Hanson,** named vice president, sales; **J. P. Henebry,** named vice president and general manager, Water Div.; **J. A. Michelotti,** named asst. vice president, operations; **C. E. Gross,** named controller; **R. J. Kalb** named vice president and group executive, Scale & Electronics Divisions; **G. N. Clune,** named asst. general manager, Scale Div.

Symington Wayne Corp.—**F. L. Bredimus,** appointed vice president, sales; **C. H. Godschall,** appointed vice president, manufacturing.

Pratt and Whitney Co., Inc.—**G. A. Crittenden,** appointed asst. sales manager, Distributor Products; **C. L. Olson,** appointed sales-service engineer.

Keystone Manufacturing Co.—**J. C. Woodle,** appointed vice president, sales.

DeWalt, Inc.—**G. D. Hale,** appointed asst. to the president.

Ravens - Metal Products, Inc.—**John Holding,** named vice president and manager, manufacturing.

Vickers, Inc.—**R. T. Everett,** appointed manager, selenium process.

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W. B. Bishop, named president, Basic, Inc.

Luxo Lamp Corp. — **Robert Rubin,** appointed manager, Western Div.

Hewitt-Robins, Inc.—**J. E. Van Stone,** appointed Cleveland district manager; **R. S. Schuba,** appointed Detroit district manager.

Pure Carbonic Co.—**T. H. Townsend, Jr.,** appointed central regional manager.

Detroit Power Screwdriver Co.—**D. P. Lamb,** appointed general sales manager.

Ceco Steel Products Corp.—**H. A. Levitt,** appointed manager, door dept.

OBITUARIES

J. A. Pollak, chairman of the board, Pollak Steel Co., Cincinnati.

J. L. Hench, 76, chairman of the board, Mid-West Forging & Manufacturing Co., Chicago.

D. A. Friedman, 37, president of Solar Steel Co., Cleveland, and manager of its Union, N. J. warehouse.

H. H. Fuller, vice president, Bethlehem Steel Co., in charge of the company's Pacific Coast Div.

J. H. Brennan, 58, chief metallurgist, Union Carbide Metals Co.

C. L. Holmberg, director of administration, general offices, Inland Steel Co., Chicago.

Litton Systems, Inc. — **G. T. Scharffenberger,** named executive vice president.

Cutler-Hammer, Inc. — **W. E. Fromm,** appointed director, research and systems engineering, Airborne Instruments Laboratory Div.

Torrington Manufacturing Co.—**A. A. Atalla,** appointed engineering manager, Connecticut Air Moving Div.

Carco Industries, Inc. — **C. A. Russo,** named president; John Bello, named vice president; **G. A. Fairweather,** appointed operating manager.

Radiation Technology, Inc.—**J. T. Bracken,** named president; **W. R. Champion,** named secretary; Loyce Turner, named treasurer.

Studebaker-Packard Corp.—**F. J. Suslavich,** appointed vice president and general sales manager.

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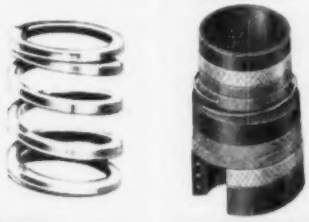

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YOU ARBITRATE IT!

A Family Matter

■ Shortly before the regular vacation shut-down in a metal-stamping plant, one of the employees found himself in need of extra money because of illness in his family. So he told the foreman: "If the company wants any work done during the vacation, I'd appreciate a crack at it."

The foreman agreed to let the man put in two days during the shut-down, on some minor repairs. When the vacation period was over, and the others learned what had happened, one of the regular maintenance men filed a grievance. "I have top seniority among maintenance men," he said. "If you needed anything done during the vacation shut-down, you should have offered me the work first."

Just a Favor—"We didn't need anything done," answered the foreman. "It was a make-work project just to help out a deserving employee. We're trying to run this shop in a considerate way, with due regard to human relations. What good would it have done if I had offered work to someone who didn't ask for it?"

The dispute eventually went to an arbitrator selected from the panels of the American Arbitration Assn. How would you rule?

The Arbitrator Ruled:

The arbitrator said that the foreman's intentions were of the best. But he added, "When a group signs a collective bargaining agreement the group interest becomes paramount. When a seniority clause is written into a contract, it is understood to represent fair play for one and all." Accordingly, he directed the company to give the grievant two days' pay.

From the files of

The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the June 8 issue.

CAUTION: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

EF

Wire Mesh Belt Furnaces

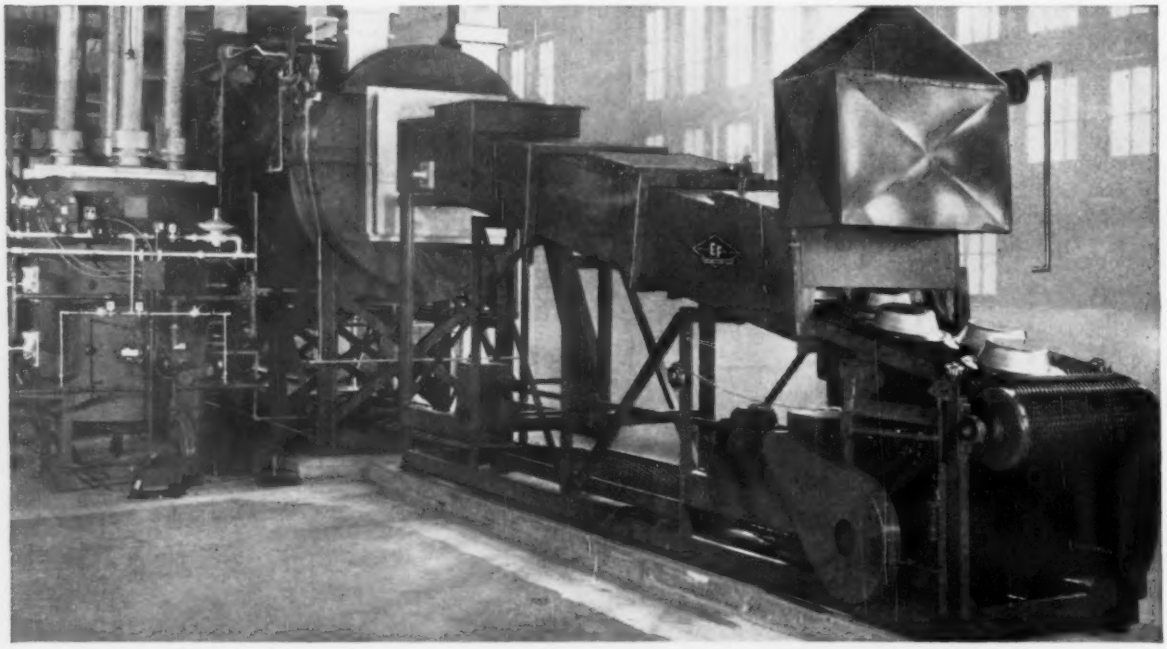
for bright annealing stainless steel and alloy stampings; also sintering, brazing and other heat treating operations.

The EF fuel fired, muffle tube, hump type wire mesh belt furnace pictured below bright anneals 500 pounds of large nickel-chrome alloy stampings per hour at 2150°F in a dissociated ammonia atmosphere. The heat resisting alloy muffle tube protects the materials from contamination by the products of combustion, and the inclined or hump design helps to contain the special atmosphere.

Horizontal straight-through, muffle tube, wire mesh belt furnaces are widely used for sintering ferrous and non-ferrous metal powder products, copper brazing, brass brazing, silver soldering, fluxless copper brazing of stainless alloys, and similar operations.

EF radiant tube fuel fired or electrically heated furnaces, of either hump or straight-through design, can often be used in these services without requiring a muffle.

Call the EF engineers on *every* heat treating problem. Our long experience and extensive research and development facilities can save you both time and money.



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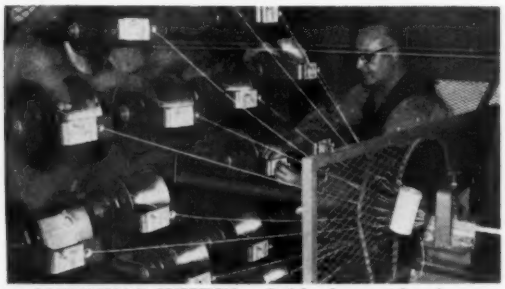
Weaves Threads for Space

Weaving multi-wire Space Age cables is a new type of spinning wheel at Lockheed Aircraft's Van Nuys, Calif. plant. It's part of a 25-ft long wire-stranding machine that's saving Lockheed



SPINNING WHEEL: Cable from 18 wires.

$150,000 a year. In operation, wires are reeled from 18 spools on the face of the wheel, sent twisting through holes into a smaller wheel and shaped into a cable by a forming block.

Call for Nuclear Rocket

Washington is taking a second look at the nation's nuclear rocket program. President Kennedy has ordered a new study of nuclear rockets to see if a crash program would give the U. S. an edge in the space race. Meanwhile, congressional space-committee leaders are calling for a speedup in development of a nuclear space booster. They say it's an absolute necessity for future deep-space explorations.

Russian Extrusion Manual

The Russian "bible" on extrusion, a 650-page manual, is now available in English. Intended for use by engineers, technicians, and students engaged in making tubes, rods and profiles—mostly nonferrous—this manual describes in detail all aspects of extrusion.

Saturn Needs Elbows

Large diameter, seamless, stainless-steel elbows, a new type of fuel-line plumbing for the nation's liquid-propellant rockets, are needed. One contract, awarded the Astronautics Div of Chance Vought, initially calls for 8-in. diam, 90° seamless elbows for the Saturn rocket. Ultimate tensile strength will be 100,000 psi with very thin wall structure. "The new concept in elbows will require dynamic technical breakthroughs in fabrication techniques," says D. W. Kraybill of the Astronautics Div.

Work Around the Clock

A work period of eight hours followed by leisure time is not necessarily the best way to accomplish certain specialized tasks involving around-the-clock operations. Tests conducted by a USAF-sponsored team showed the two-hour-on, two-hour-off and four-hour-on, four-hour-off cycles gave "a more favorable adjustment."

Reactor Heat Gives Kw's

The recent start-up of a test reactor means the program to develop auxiliary electric power for space vehicles from nuclear reactors is under way. The lightweight reactor, fueled by a uran-

OUTER SPACE REACTOR: 3 kw of electricity.

ium-zirconium hydride alloy, generates 50 kw of heat. Heat from the core transfers via a liquid-metal coolant to a boiler of mercury. Mercury vapor then passes into a tiny turbine which will generate 3 kw of electricity.

Metals in Outer Space

How will materials take to outer space? This is the purpose of a recent research contract awarded the National Research Corp. by the USAF. NRC will study how structural materials vaporize at temperatures ranging from 80°-800° F in vacuums equivalent to altitudes of 500-600 miles. Under the grant, NRC will determine rates of gas evolution with respect to time, temperature, thickness and surface.

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New Series 15 Grinders

- **Speed—6000, 9000, 12000 and 15000 rpm**
- **Weight—6½ lbs.**
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- **Grip or straight handles with lever or thumb throttles**

Twelve new Ingersoll-Rand grinders in a completely new size and power range! These small, high-performance grinders are specifically designed to fill the need for light weight, easy-handling tools that will hold their speed under load on a wide variety of difficult grinding and buffing jobs.

Series 15 Grinders fill the bill—and offer manufacturers important new proof of tools to increase Annual Dividends on Payroll Dollars.*

215A-8

Ask your AIRengineer for a convincing on-the-spot demonstration of how these new grinders—as well as all other Ingersoll-Rand air tools—can earn an Annual Dividend on your Payroll Dollars.

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Planned Annual Retooling increases output per man

Watervliet Arsenal

FINISHED GUN BORE: Head-on view down muzzle of 105-mm tank gun shows tape-controlled rifling pattern.

How to Plan Production Runs With Precision in Mind

Precision is a key word in the Space Age. It also plays a major role in metalworking.

Tolerances are getting tighter and tighter. But design engineers are equal to the task.

By W. N. Redstreake
Associate Editor

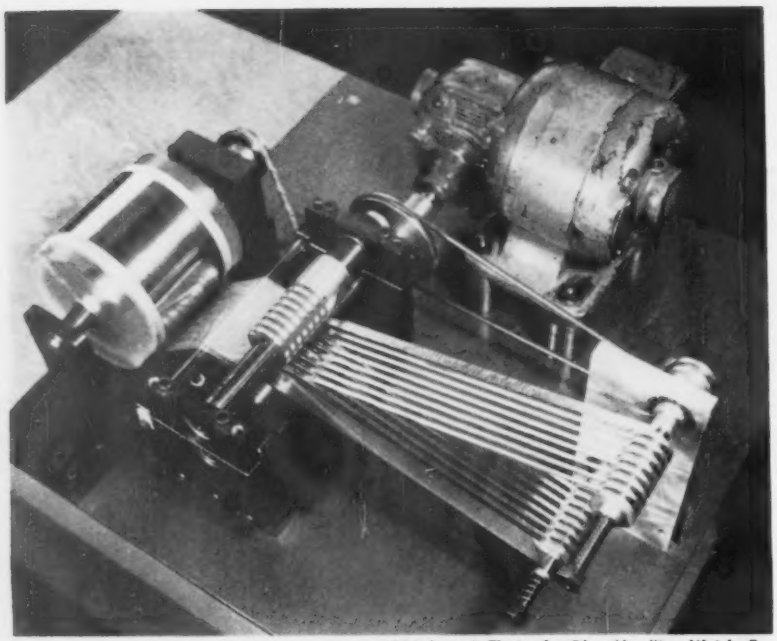
■ Precision metalworking means many different things to different people. To some, it means working to tolerances of a few millionths of an inch. To others, a few thousandths is close enough. Part size is often the determining factor.

Whatever the definition, one thing is certain: The trend is toward making objects more accurate, more clearly defined, sharper, more uniform, or even approaching perfection. The age we live in demands ever-tightening tolerances.

Hard to Measure—Close tolerances hinge on precision measurements. Compare a human hair of 0.0023-in. diam with the edge of a metal foil that's rolled to 0.0001 in. On production runs, the thick-

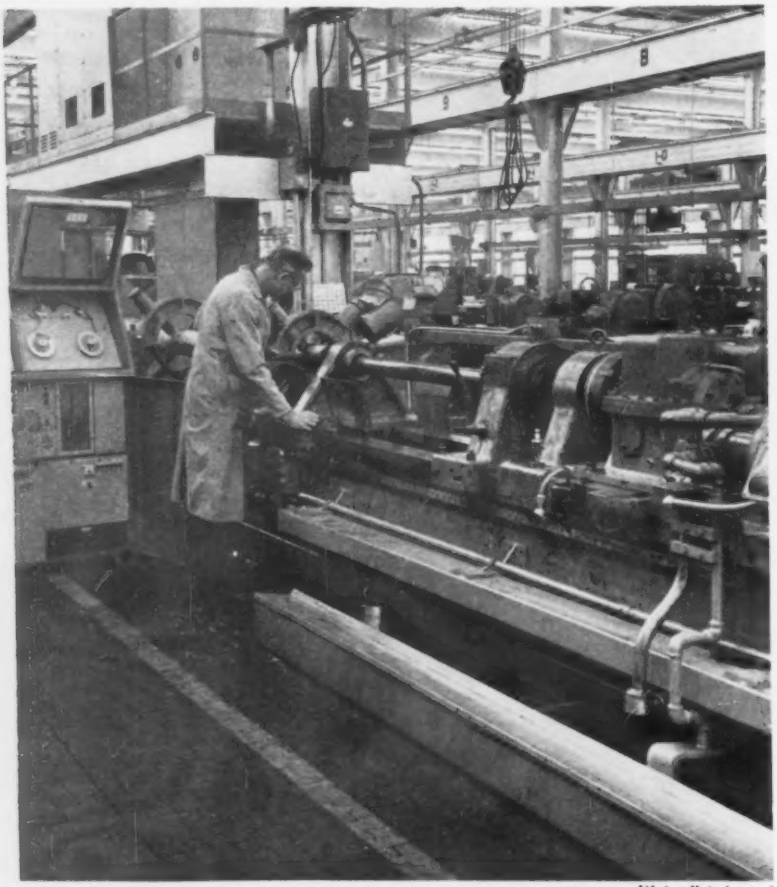
DESIGN ENGINEERING SHOW

Detroit will be the site of this year's Design Engineering Show. The time and place for important events can be found on Page 167. A complete rundown of the technical sessions starts on the same page. Turn to Page 124 for some highlights of the show and to Page 168 for an up-to-date list of exhibitors.



Metals and Electronics Div., Hamilton Watch Co.

SLICE TO SIZE: Custom-made machine slices 4-in. wide foil into narrow strip forms. A single pass yields 14 thin cut-to-width magnetic tapes.



Watervliet Arsenal

TAPED RIFLING: Electrical impulses on thin magnetic tapes control the path of a cutter and dictate proper speeds in rifling 105-mm gun bores.

ness of this foil is held to ±0.000005 in.

Five millionths of an inch proves mightly hard to measure. The thickness of glue on a postage stamp is about 0.0007 in., or 140 times as thick as 0.000005-in. tolerance.

Quality work of this nature requires many hours of detailed-engineering and basic-material studies. Precision must be the watchword from the melting furnace to final fabrication.

Where does precision in metalworking begin? For many close-tolerance jobs, you've got to build precision into the metal through careful selection of raw materials and by precise control of alloy composition. Then you have to maintain strict control over all follow-up processes.

Keep it Pure—Let's find out how one company makes ultrathin metal foil. First, all raw materials are fed into a high-frequency induction furnace where they're melted into ingots. Impurities are kept down to a few thousand parts per million.

Ingot weights vary from 10-50 lb. After the ingots are forged to desired shape with a 1500-lb hammer, they're ready for hot rolling. Forging reduces the ingots to ½- x 3-in. bar stock. Hot rolling brings these bars down to 0.08-in. thick strip.

Next, a shot-blasting setup removes harmful oxides from the strip's surface. These oxides build up during the hot-rolling process. Continuous grinding on a specially-built machine removes all surface defects.

Roll, Then Anneal — Several passes on a rolling mill bring the thickness down to 0.04 in. Then the strip passes through an annealing furnace. In a hydrogen atmosphere, it's heated to 2150°F.

After annealing, the strip is ready for further processing. A Sendzimir mill cold rolls the metal down to desired size with intermediate anneals as required. Tolerance on the finished strip or foil is held to ±5 pct of a specified thickness.

End uses for these strips and foils

include: Shim stock, springs, drive bands, magnetic tapes for computers, honeycomb materials and other precision applications.

Forge Superalloys—Now, we'll check some of the latest data on forge-to-shape parts. Aerospace requirements place severe demands on construction materials. To meet these ever-changing needs, new alloys are being developed. One class of new materials is the forgeable superalloys.

The properties of these superalloys depend on alloy compositions, forging practices and heat treatments. One of the newest of the forgeable superalloys is V-57. This iron-base alloy contains 0.03 pct C, 15 pct Cr, 25.5 pct Ni, 1.3 pct Mo, 0.3 pct Al and 3 pct Ti.

Forgeable V-57 is essentially a modification of superalloy A-286. It boasts good room-temperature strength and excellent stress-rupture properties at elevated temperatures. To date, this newcomer is still in the test stages. Its uniformity leaves much to be desired.

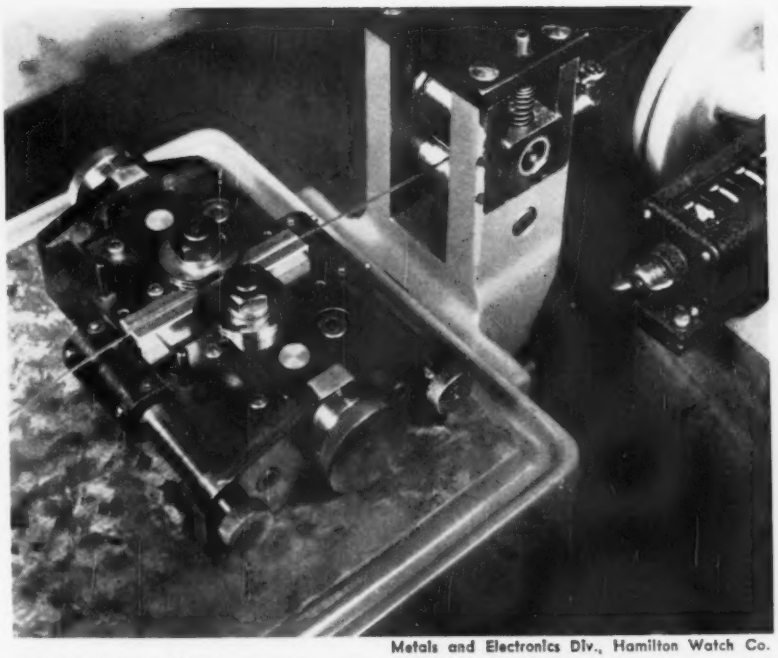
Rosy Future—Spokesmen from forging companies and mill suppliers are confident the new alloy has good potential. These spokesmen expect V-57 to replace A-286 in many applications.

Impression-die forging of most superalloys has been restricted to disk shapes. However, complex impellers and airframe parts are now being forged to tight tolerances. These precise parts are forged in both iron- and nickel-base superalloys.

Average design limitations for precision and semi-precision steel forgings appear on page 108. Most forgings in the precision category require no machining.

In normal practice, the best guarantee for decarburization is 0.03 in. For special jobs, forged parts can be processed to eliminate all decarb.

Precision Casting — Close-tolerance castings also allow totally-new design freedom. One new casting process combines the basic advan-

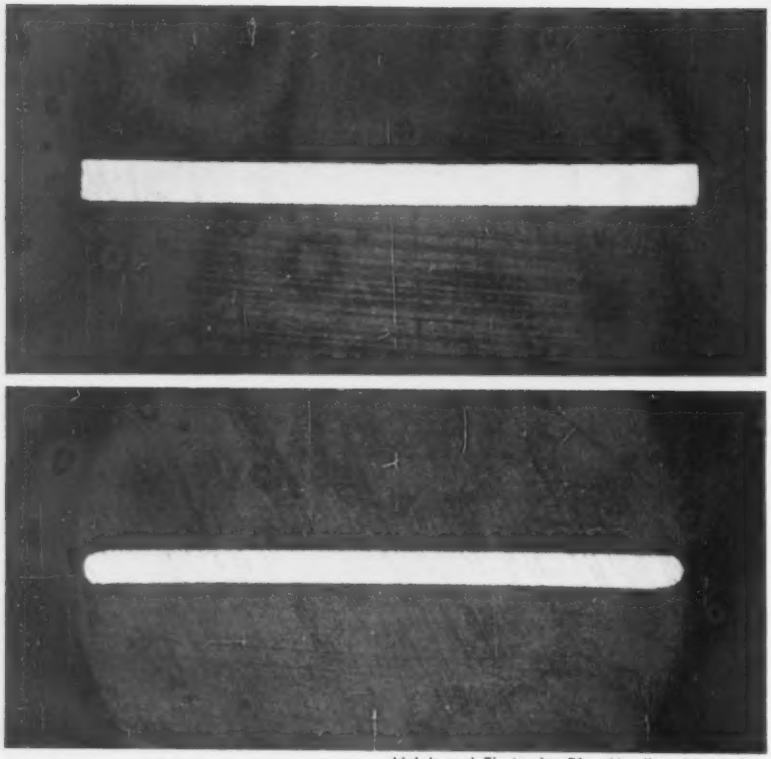


Metals and Electronics Div., Hamilton Watch Co.

REMOVES BURRS: Carbide cutters smooth rough edges on narrow strip. This burr-free strip is used to make fatigue-resistant watch springs.

Schwartz Boring Co., Inc.

HARD TO HOLD: Simple setup speeds production of leveling platforms for the guiding gyroscopes inside missiles. Accuracy is a prime factor.



Metals and Electronics Div., Hamilton Watch Co.

READY TO USE: After deburring (bottom), the strip serves many functions especially where high-fatigue properties are needed. Minor flaws on the strip's edges can cause lost-strength problems in critical applications.

tages of investment castings with those of other low-cost fabrication methods.

First, the investment-casting process is used to form precise shapes. General tolerances are ±0.005 in. per in. Some dimensions are held within ±0.003 in. per in. These tolerances are typical of the investment-casting process.

Subjecting the shapes to secondary operations, such as coining, cold forming and sizing, brings critical dimensions to ±0.001 in.

Let's move along to final fabrication methods. We'll start with short runs and prototype parts.

Tooling Problems—Tell a tool engineer that you need a setup to machine a million parts and he won't bat an eye. That's because long runs usually justify buying special equipment to mass produce work most efficiently.

But tell the same engineer that you need 15 of one part, 30 of another, and 50 of still another—before the week ends—and you've tossed him a real problem. It's a cinch that it will take lots of time and effort to make each part by manual-control methods.

Jigs and fixtures might help. And master cams can be used to actuate and control all working cycles. However, these tools and fixtures often prove costly. They also take awhile to set up.

Prototypes—Punched cards and tape-controlled machine tools offer one of the best answers to medium- and short-run problems. At a major jobbing shop, a single tape-controlled unit handles prototype parts and short runs.

This versatile machine drills, taps, reams and counterbores. It locates and drills holes to accuracies of ±0.001 in. per foot, with production up to 15 holes per minute. In addition, the machine performs spot facing, location boring and straight-line milling. Maximum spindle speed is 2600 rpm. Top feed rate is 21 ipm.

Mr. Joseph Schwartz, Vice President, Schwartz Boring Co., Inc., Detroit, reports: "We specialize in machining prototypes and experimental parts. Therefore, absolute precision is a vital factor.

"To make precise parts in medium quantities," says Mr. Schwartz, "we're forced to work at the minimum total-job cost. This overall cost includes fixture and set-up expenses."

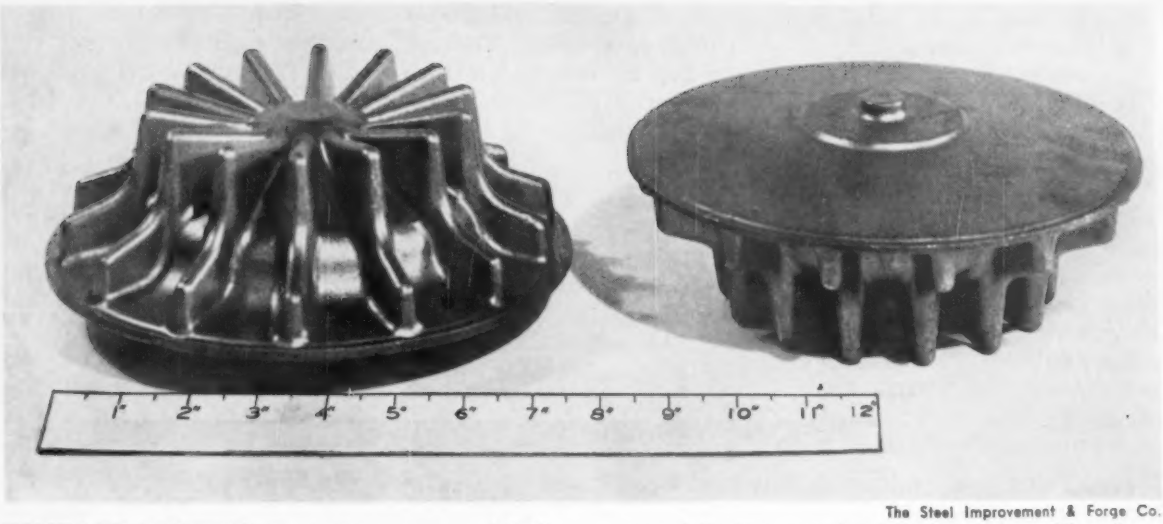
Use Simple Fixture—Let's follow a typical production run through this jobbing shop. A case in point centers on 20 aluminum-body shapes. Only one fixture is used. This simple fixture consists of a plate with two dowels in it.

First, one face of each of the 20 parts is milled. Then, two holes are bored in each part. These bored holes, with ±0.0005-in. tolerance,

Check Forging Limitations

	Semi-Precision Forging	Precision Forging
Draft Angle, internal	3°	1°
Draft Angle, external	0°-3°	0°-1°
Web Thickness, in. (min)	0.125	0.100
Rib Width, in. (min)	0.187	0.125
Corner Radii, in. (min)	0.060	0.050
Rib Height, in. (max)	8 x rib width	8 x rib width
Fillet Radii, in. (min)	0.187	0.100

The Steel Improvement & Forge Co.



The Steel Improvement & Forge Co.

IMPELLER FORGING: Superalloys such as A-286, 19-9 DL, Inconel X and AF-1753 have been forged successfully into complex impeller shapes. Most forgings in the precision category require no machining.

serve as locators. Dowel pins on the fixture fit in these holes.

This initial setup takes a little time. The operator has to go through a think-and-do process 20 times. After this early work is wrapped up, the entire job requires only one thought process for each different operation.

The operator places the parts, one at a time, on the holding fixture. Now, he's ready to stand back and let automation take command. The tape-controlled machine mills each surface to size; then it drills 15 through holes.

At this point, the fixture flips over. Fourteen more holes are drilled and tapped in the second surface. The tolerance on these tapped holes is ±0.003 in.

Production Boring—To finish up the job, eight holes are bored in each part. Again, the simple fixture acts as a setup man. All 160 holes are bored to within ±0.0005 in., with only eight tool settings.

Compare the cost of this entire job with open-setup costs. The latter method uses no fixtures and no "set" production techniques. Each part is worked individually.

With the open-setup method, it takes almost 5 hours to machine each part. By using the low-cost fixture and automation, the per-part machining time tumbles to less than 2 hours.

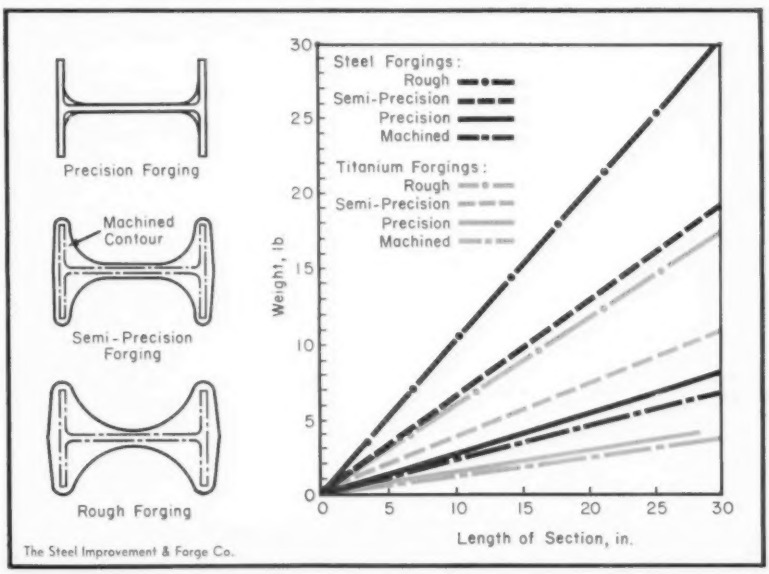
Automation offers another major benefit: Waste and rejects are greatly reduced. Machines don't make mistakes. Man, on the other hand, often works by trial-and-error methods.

Precision Punching—Next, let's see how automation fits into punch-press applications. We'll check out a template-guided unit that punches complex shapes. This unit punches, notches and nibbles heavy-gage sheet metal.

Adjustable steel tapes, reading to 1/10 in., determine coarse readings for all hole-to-hole dimensions. Final adjustments are set with micrometer gages. These gages read to 0.001 in.

The machine handles stock up

Forge Parts to Desired Shape



The Steel Improvement & Forge Co.

to ¼ in. thick, 24 in. wide, and in any length. Overall accuracy is within ±0.002 in.

A toggle switch provides the changeover from single-hole punching to 165 strokes-per-minute nibbling. Thus, the automated unit is easily adapted to straight - line punching. It also makes circular or rectangular cutouts.

All template-control media are made on an accessory unit. They're punched directly from a customer's part drawing. This eliminates the engineering time that's normally needed to make template prints.

Tighter Tolerances — We'll set numerical controls aside and check out how to form holes in production parts to even tighter tolerances. Strip broaching yields one solution.

With a straight-line push of 4700 lb, a combination drilling, chamfering and broaching machine finishes connecting-rod holes to tolerances of ±0.0007 in. Output from this six-station setup exceeds 500 rods per hour.

At the first station, the machine operator loads four connecting rods in a fixture. Then he actuates a hydraulic-clamping device. The machine drills the holes to half depth at the second station. An undersized drill completes the holes at station three.

Core Drilling—After most of the stock is removed, core drilling takes place at the next station. The core drill leaves only enough stock for broaching.

The fifth station consists of an automatic-recessing tool holder and formed bits. These bits chamfer both sides of the drilled holes at the same time.

Broaches push into the holes at the last station. A pilot centers each broach as it enters the undersized holes. Pushing forward at 30 fpm, roughing and finishing teeth on the broaches take their respective cuts.

Two ball burnishers follow the finishing teeth. These burnishers remove 0.0003 in. of the hardened-rod stock. Hardness of the forged-steel rods ranges between 197-241 Bhn.

Bore Rifling—Now, let's go back to tape controls. We'll study an unusual setup. A 10-in. diam spool of ultrathin magnetic tape directs precision rifling of 105-mm gun bores.

Col. W. M. Tisdale, Commanding Officer, Watervliet Arsenal, reports: "The Arsenal uses a 'taped-control' process to rifle tank-gun bores. This process saves from 40-80 hours in setup and lead time. It also achieves a far greater degree of accuracy than was formerly possible."

Tape-recorded electrical impulses have replaced the traditional "ribbon"—actually a 4- x 1-in. x 20-ft long steel bar—as the remote-control medium which dictates the proper speed, path and type of rifling.

No Vises—The new system does away with vises. Previously, as many as 15 vise-like clamps were used to hold the heavy control bar in position. Now, a tape relays the rifling directions through a small motor. This motor actuates the cutter.

Taped data rotate the cutter through a spindle. Rotation speeds hinge on longitudinal carriage movements and a fixed helix slope. The helix slope depends on the relationship of X and Y pulses on two channels of the magnetic tape.

For any number of X pulses, the system rotates the spindle to the proper position, within ±0.001 in. Rifling accuracy, of course, hinges on the performance of the magnetic tape. This type of tape is made from the precision foil discussed on page 106.

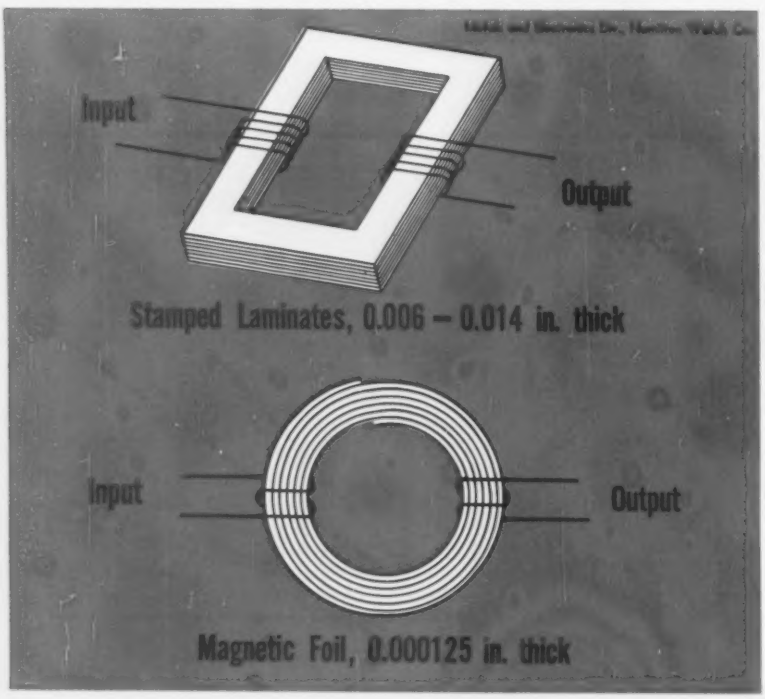
How does the foil become tape? And what are some of the other uses for this precision material?

Ultrathin foils down to 0.00008 in. thick are usually rolled in 4 in. maximum widths. These widths must be slit to desired size.

Electrical Problem—Before we check out precision slitting, let's see how this close-tolerance foil makes it possible to design smaller, more powerful transformers.

Many transformers for miniaturized equipment are made from stampings of soft magnetic alloys. Stamping thicknesses range from 0.006-0.014 in.

Foil Ups Transformer Output



Transformer cores, built up from these thin stampings, are insulated from each other by a rubber-base or magnesium-oxide adhesive. The efficiency of such a transformer depends upon the alloy used. It's also influenced by the thickness of the stamped laminates.

As laminate thickness decreases in miniature transformers, efficiency increases. Thus, the thinner the stampings, the better the transformer. But there's a fly in the ointment. The cost of the process limits the thickness to which it's practical to use stamped laminates.

Foil Cores—To boost efficiency, a new type of transformer is used to meet Space Age demands. Called a toroid or bobbin core, it consists of thin burr-free foil that's wound to form a core. As the foil is accurately rolled thinner and thinner, transformer efficiency climbs.

L. A. Hurwitz, Director, Metals and Electronics Div., Hamilton Watch Co., reports: "Hamilton has rolled literally hundreds of miles of such foil for toroids in thicknesses down to ⅛ mil, 0.000125 in. Rolling tolerances are ±0.000003 in.

"Size control during rolling," Mr. Hurwitz adds, "hinges on X-ray gage readings in initial passes. Continuous recording beta-ray gages monitor final finishing."

The width of all foils used in the toroids is quite narrow. In fact, three widths of the extra-narrow 0.000125-in. thick foil can pass through the eye of a needle. And there's room to spare.

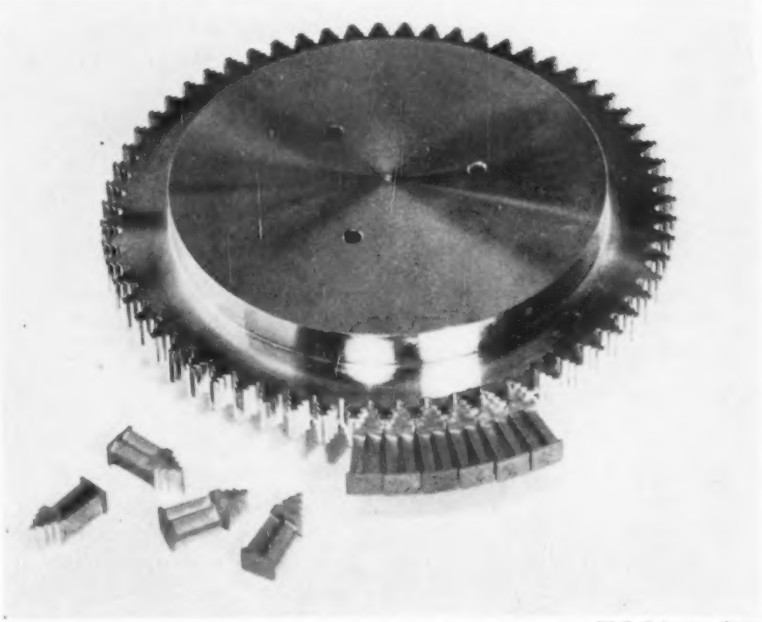
Watch Springs—Edge preparation of other thin strips for watch springs, torque-control drives and other fatigue-resistant applications requires follow-up processing after slitting. A cobalt-base alloy is used for this type of work.

Physical and mechanical properties vary too much in commercial alloys. This means you've got to melt your own alloys for such close-tolerance work.

For watch springs the strip is rolled to 0.0025-0.006 in. in thickness. After the strip is slit to de-

H & H Machine Co., Inc.

ACCURATE CUTS: Home-made cut-off machine slices 1/16-in. diam molybdenum rods to 0.08 in. lengths, ±0.003 in. Output is 5000 cut-to-length parts per hour. The machine adjusts itself for abrasive wear.



Wall Colmonoy Corp.

CRITICAL ASSEMBLY: Missile rotor has 63 blades, held within ±0.002-in. dimensional tolerance. Blades are brazed into position at 1950°F.

Selas Corp. of America

STEAM-TURBINE BLADE: Stellite insert and filler material (center) are brazed into milled slot on turbine blade. At right is finished product.

sired width, it's drawn through a deburring machine. The slitting and the deburring machines were especially designed for this type of work.

As the narrow strip passes between a series of carbide dies, its edges are rounded. Only about 300-400 ft of some alloys can be processed before the dies require resharpening.

As Mr. Hurwitz states, gaging is a critical problem. It's almost impossible to maintain accuracy in volume production by manual methods. The only safe approach is automatic inspection.

How Flat?—A very good example of automated gaging centers on a precision lapping operation. Silicon and germanium wafers are lapped to tolerances of ±0.00005 in. An electric gage controls the entire lapping cycle. This setup allows one operator to handle several planetary-lapping machines.

One of the most critical lapping problems involves beryllium-copper balance wheels for watches. These parts are lapped flat within 0.0008 in. All other dimensions must be held within 0.0003 in. Commercial lapping machines can't handle this work. Therefore, Hamilton's engineers had to design and build a special machine.

This machine uses the same electrical gaging system that's available for commercial lapping units.

To wrap up this article, we'll move along to some bigger parts. No matter how big a missile part, precision can't be forgotten.

Rotor Brazing — Controlled-atmosphere brazing maintains tolerances of ±0.002 in. in assembling turbine rotors for missiles. Each 10-in. diam rotor assembly consists of 63 blades, brazed to an A-286 alloy hub. See figure, p. 111.

The blades are cast from a cobalt-base chrome-molybdenum stainless alloy. Each hub is carefully machined on a lathe to ±0.0005 in.; then it's cleaned in a pure dry-hydrogen atmosphere.

Cleaning takes place at 2050°F. The controlled heat removes all surface contaminants.

After the blades are brazed into position, the hub receives a 0.003-0.005 in. thick protective chromium plating. Here's how each precision assembly takes place.

Controls Flow—First, the root of each blade is dipped into a paint-like brazing preventive. This is done to limit the brazing-alloy flow onto the hub surface.

The next step is actual assembly. This work is done by skilled technicians. A holding fixture insures proper blade-to-hub height all the way around. Maximum out-of-line clearance is ±0.002 in.

Using a glass eyedropper, a skilled worker applies the brazing alloy to the assembled rotors. Cement binders are mixed in with the powdered brazing alloy. The position of this mixture on the parts and the ratio of brazing alloy to binder material are determined by experience.

After inspection, the fixtured assemblies enter the brazing furnace. This furnace uses a pure dry-hydrogen atmosphere. Its dew point is –80°F. Brazing takes place at 1950°F. During the entire brazing cycle, the temperature is held within a tight range of ±10°F.

Acknowledgments — Many companies cooperated in the preparation of this article. Special thanks go to: Battelle Memorial Institute, Casting Engineers, The Cross Co., Metals and Electronics Div. of Hamilton Watch Co., H & H Machine Co., Inc., The Robert Mitchell Co., Ltd., Schwartz Boring Co., Inc., Selas Corp. of America, The Steel Improvement & Forge Co., Wales-Strippit Inc., Wall Colmonoy Corp., and Watervliet Arsenal.

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Complex Rotors Cast to Shape

Semi-Cold Process Locks Laminates on Rough-Machined Shafts

Pure aluminum is mighty hard to cast. It's also tough to machine. But it has very good electrical properties.

Ultrahigh-purity aluminum is now being used to form efficient cast-to-shape rotors.

■ A semi-cold forming process yields complex cast-to-shape rotor assemblies. On production runs, stacked laminates can even be cast over rough-machined shafts.

End rings on these as-cast rotors require no machining. This reduces finishing problems. Since the rotors are cast on semi-finished shafts, the problems of dummy-shaft removal also become a thing of the past.

Flaw Free — For this precision work, the molding medium is aluminum. It's 99.9 pct pure. As it fills the slots on the stacked laminates, the ultra-dense aluminum leaves no cavities or voids.

The end rings on the new rotors can be made quite small. In fact, due to the soundness of the high-purity aluminum, overall mass is greatly reduced. Other advantages of an as-cast rotor include: High conductivity, low null voltage, light mass and long life.

Commenting on his company's precision-casting process, Mr. Vincent Forras, President and Chief Engineer, Chase Electronics Motor Div., Elmhurst, N. Y., states: "This process is truly revolutionary. It offers a whole new concept of minimum design to rotor manufacturers."

Tricky Stuff—Until now, the end rings on most rotors have been overdesigned. This is common practice for two reasons: Pure aluminum is hard to cast with any degree of predictable soundness; it also proves tricky in machining.

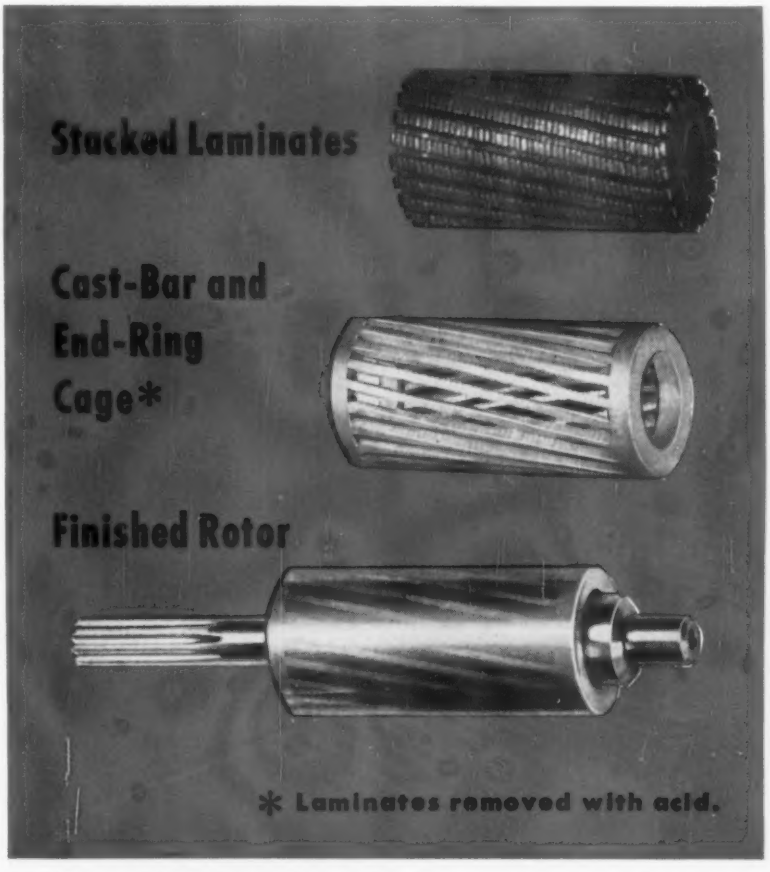
Using the semi-cold forming process, rotors are cast to close tolerances in a single step. After they're cast, only the outside diameters need to be polished. A quick pass on a grinder touches up the outer surface of each cast stack. In many cases, even this simple grinding step can be eliminated.

Next, the bearing lands on each semi-finished shaft are ground to desired concentricity. At this point, the entire rotor unit is ready for insertion in a stator. Visual inspection is all that's needed prior to actual motor assembly.

All Sizes—Electrical properties are greatly improved because the stacked laminates don't need to be preheated. Higher rotor speeds are also obtained. These ultrahigh speeds hinge on flaw-free uniformly-dense rotors.

The new semi-cold forming process can be used to cast all sizes and types of rotors. It also proves a time and money saver in casting other complex thin-walled shapes.

Research is underway at Chase Electronics to adapt the new process to other materials. Some success is reported with copper alloys.



SINGLE-STAGE CASTING: Stacked laminates (top) are aligned on a rough-machined shaft. Then the semi-cold aluminum is cast around the stack to form a close-tolerance cage. End result is a finished rotor.

Tailored Alloys Help to Solve Investment-Casting Problems

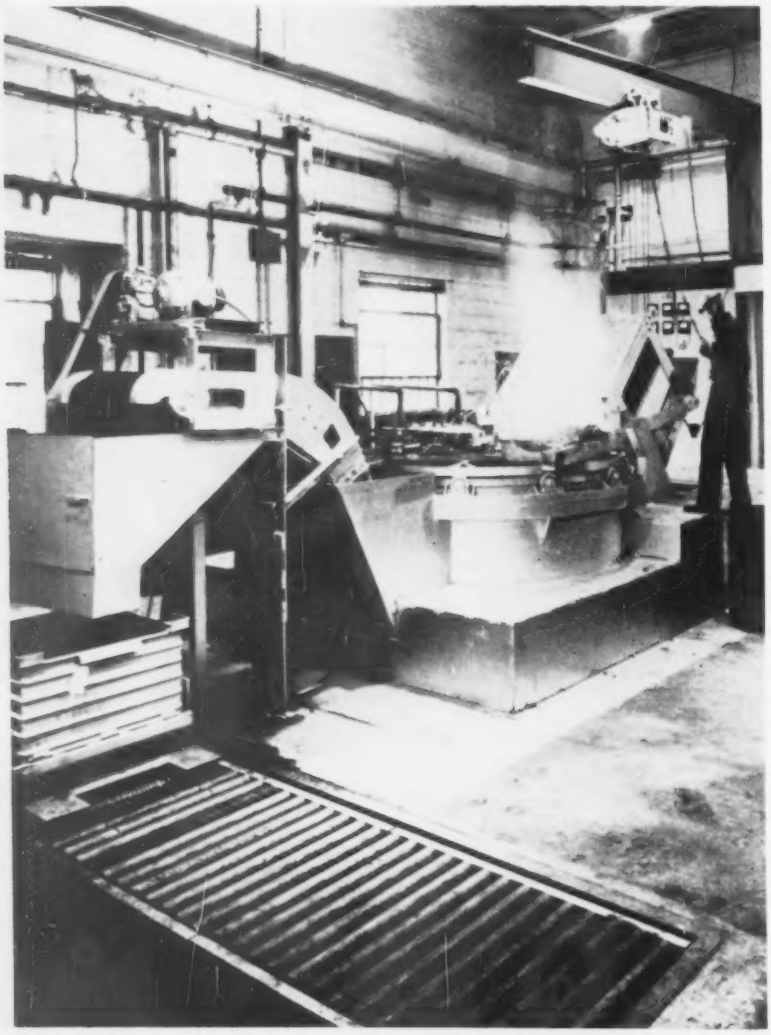
A new and fast-growing concept is to tailor alloys to specific processes. This idea proves useful in investment casting.

Metallurgists claim the custom metals open the door to new design opportunities.

By **R. H. Eshelman**

▪ Economic and consumer demands force engineers to work close to material specifications. This means working down to the wire in regard to physical and mechanical limits.

Twenty years ago a simple answer to any complex design problem was to strengthen critical parts. Now, overdesign is as dead as the dodo. One of today's prime needs centers on weight reductions. Mass must be reduced without hindering stress-carrying ability.



POURING HEAT: Molten alloy from 2000-lb furnace pours into water-cooled tank. The metal forms shot as it falls through the water.

Case in Point—Consider the jet engine: Operating temperatures keep rising. Thus, dependable air service hinges on alloys that resist the effects of soaring heats.

One answer centers on a heat-resistant stainless alloy that boasts good high-temperature strength. Cobalt-base and some nickel-base alloys yield the answers to other high-temperature weight-reduction problems.

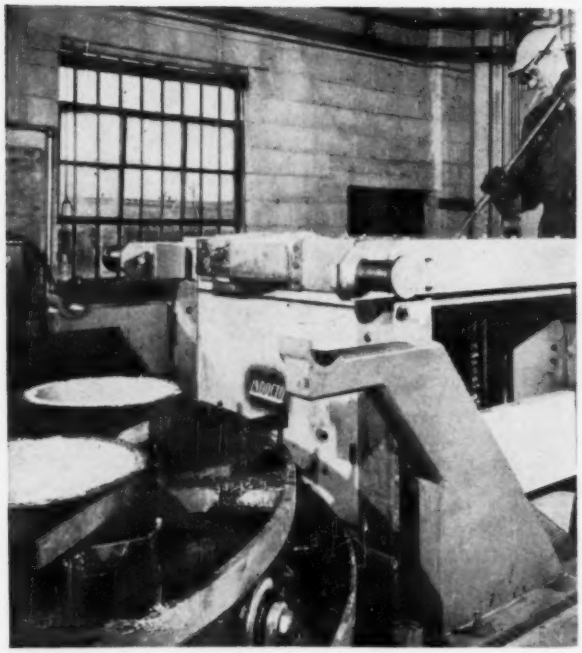
Many of today's high-strength parts are made by investment casting these superstrength alloys. Finished castings serve in aircraft and other commercial products. The latter catergory includes electrical and electronic machinery, heavy industrial equipment, textile machines, diesel-engine parts and other heavy-service items.

Rapid Growth—The investment-casting industry is growing much faster than the national economy. Investment-casting processes often prove costly; but they do yield good results. Among their advantages are fine surface finish, intricate detail and close tolerances. Also, investment castings insure consistent internal quality and inherent strength.

Some cobalt-chrome-tungsten alloys such as AMS-5382 are almost impossible to machine. Despite this fabrication bottleneck, these alloys offer excellent high-temperature strength.

To take advantage of this strength, engineers often design for investment casting. Simple grinding operations touch up the finished castings to final specs.

Help or Hindrance?—For years, casters have been developing special



SCREENS METAL: Special screens on rotary unit break up the molten metal as it falls into the tank.

FINAL PRODUCTS: When casting complex shapes, tailored alloys insure proper chemical compositions.

casting methods. But they had to be content with standard alloys. Generally tool-steel alloys were used—even when chemical specs called for wrought alloys. This left much to be desired.

With wrought metals, silicon content should be held down. Silicon causes trouble in rolling basic bars and sheets. On the other hand, casters welcome a high silicon content. Instead of being a villain, silicon insures free pouring and completely-filled molds.

Fills Need—To span this gap, the WaiMet Alloys Co., Dearborn, Mich., has worked out formulas to aid investment casters. New alloys, tailored to this casting process, eliminate many of the former misrun problems. Most of these problems can be traced to the use of alloys that aren't suited to investment casting.

Optimum results depend on separate chemical analyses for bars, forging stock, plate, sand castings and investment castings. Although nominal alloys and their properties remain the same, chemistries vary to match each process.

How do you match an alloy's chemistry to a job? Often, designers or end-product users start the ball rolling. They hope to combine the advantages of a special process such as investment casting with the attractive properties of a new alloy.

Alloy Redesign — The engineer asks the investment caster to produce a desired shape with a new alloy's properties. Initial efforts may fall short. If the engineer's goal isn't met, development must be directed toward redesigning the alloy. Chemistry and heat-treat procedure can both be altered.

Using the caster's past experience, WaiMet's metallurgists pinpoint investment casting needs for the alloy in question. They alter the alloy's chemistry to suit the casting process.

For example, with 17-4 PH stainless steel, there was a lot of floundering when investment casters first tried to adapt this alloy to their work. Finally, they discovered that carbon pickup caused their problems. Programs were set up to reduce the alloy's carbon content.

Up to Snuff—Where specs call for 0.07 pct carbon in finished castings, WaiMet dropped the basic alloy's carbon content to 0.02-0.025 pct. Carbon pickup in the casting process brings the final parts up to spec limits.

Nitrogen created another problem with this same alloy. One caster picked up the element in his process. This problem was peculiar to his shop. Nitrogen in the basic alloy was reduced for this customer. As a result, his castings now meet spec requirements.

Heat-treat methods for 17-4 PH alloys also created barriers to the wide adoption of this material in investment casting. Working out heat treats on sample bars, WaiMet's metallurgists developed new heat-treat cycles. These heat treats insure optimum properties in finished investment castings.

These special heat-treat cycles are also tailored to yield the best properties in forged alloys, barstock parts or sand castings.

END PRODUCT: AmForge's top men check out a finished forging. Left to right, these key personnel include: A. G. Tichenor, div. president, J. W. Elbin, vice president mfg., and research chief Stanley Vickers.

Automated System Forges Parts Without Any Operator Effort

Hammer-forging work depends on the judgment and skill of the hammer operators.

These skilled workers hate repetitious jobs. An automated system thrives on repeat runs while cutting per-part costs.

▪ Automatic forging has made its debut. A completely-automated forging press with associated equipment turns out track links for crawler tractors. Output is at least twice that of any other forging setup.

In addition, the automatic press-forging complex requires only half the manpower needed for normal hammer or press work. Automation is complete, from billet handling to trimming and hot coining. All manual-handling problems have disappeared.

Costs Tumble—The new forging complex yields low-cost parts which are just as strong as any of today's commercially-produced forgings. Dimensional tolerances are quite stringent. Surface qualities equal or exceed those of normal press-forged parts.

Located at the AmForge Div., American Brake Shoe Co., Chicago, the automated forging setup represents almost two years of effort and nearly $750,000 in development costs.

The first work run centers on track links for crawler tractors. This initial order involves 40,000 parts per month. Each of the track links weighs 5½ lb. Current output is one finished forging every five seconds.

Previously, AmForge made these parts on several hand-operated forging hammers. All billets were heated in an oil-fired furnace. Then they were hand carried to a hammer man who shaped the links.

Lots of Work — At this stage, each forging had to pass through a trim press for flash removal. Final-

ly, a hot-coining operation corrected the irregularities and brought the links to size.

Hammerwork hinges on the judgment and skill of the hammer operator. An experienced crew can form about 300 track links per hour.

Now, let's see how the automatic complex operates. It consists of a special gas-fired furnace, billet-transfer equipment and a standard 2500-ton Erie press. Automated features modify press timing.

Special controls on the furnace permit a very short heating cycle. Each billet is brought up to 2200°F. Then the hot billets automatically push out of the furnace. Furnace output matches the operating speed of the press.

Quickly Positioned — As they leave the furnace, transfer equipment picks up the billets and carries them into the press. Inside the press, mechanical fingers take over. They move the hot billets through a four-stage die.

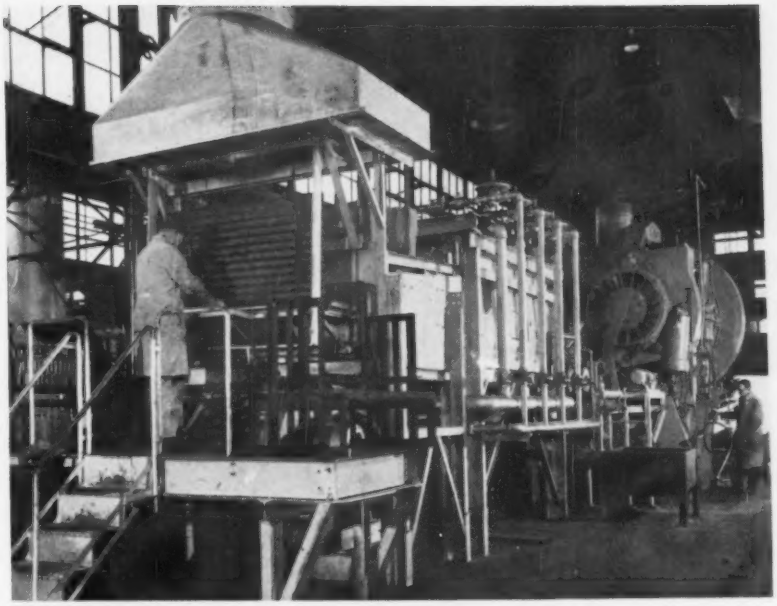
When a forging reaches the last die station, it's trimmed and hot coined in one stroke. Then it's ejected onto a continuous conveyor line. This line carries the forged part to a waiting tote box.

It's estimated that about 10-million track links are made for original-equipment manufacturers every year. AmForge shares this market with a number of other major forge shops.

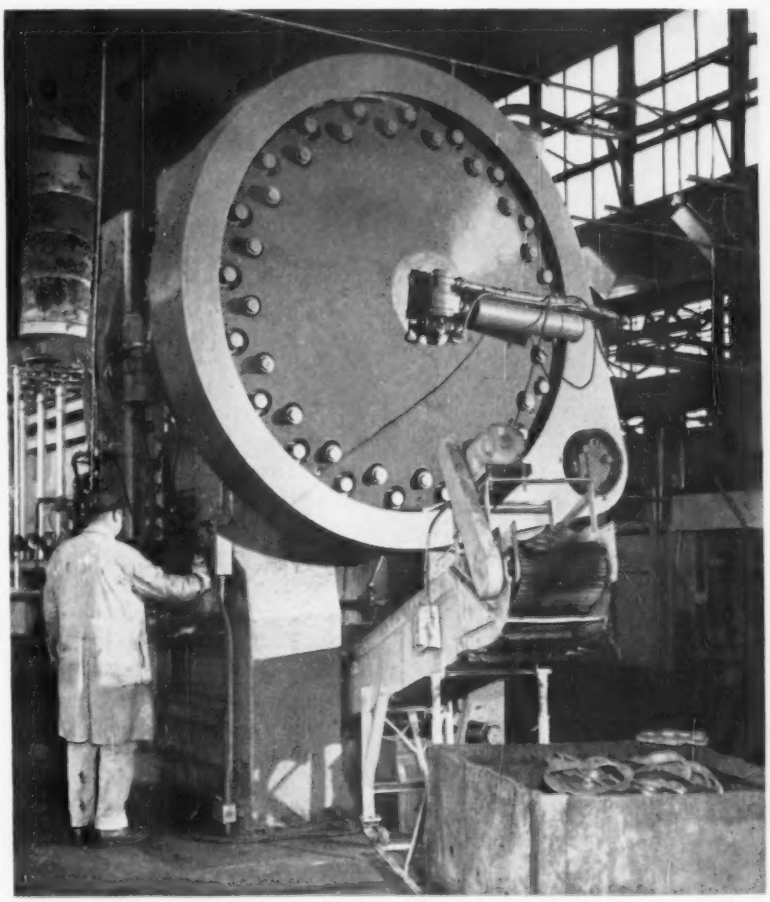
There are about 200 forged links in the tracks of every crawler tractor. Because of the punishment they must take, these links are also a high-volume replacement item. The replacement market may be as large as the original-equipment market.

Wide Potential — Many other high-volume items will lend themselves to low-cost production on the automated forging line. A few of the potentials include: Conveyor-belt links, automotive gears, and high-pressure valves and fittings.

The new forging complex boasts several advantages over normal forging methods. We'll check out



TWO-MAN JOB: Automatic complex turns out 600 links per hour. Only two operators are needed. One man is stationed at each end of the line.



READY TO SHIP: At the end of the line, a conveyor drops the finished track links into tote boxes. All trimming is done inside the press.

FOUR-STAGE DIE: Mechanical fingers transfer and position the hot billets inside the forging press. Forming takes place in four stages.

four of the major bonuses.

A big reduction in manpower is the first advantage. With complete automation, two men handle the entire complex. One man charges the furnace. The second crew member has command of the control panel in front of the press.

Using a 14-in. ram stroke, the press operates at 40 strokes per minute. For the initial link order, AmForge is running the press at a reduced speed and using alternate-stage production.

Double Output — Even at this reduced speed, the second major advantage is evident. Output exceeds 600 links per hour. This reduced-speed output is reported to be double the industry average.

As the new system's capabilities are developed, the production speed will be stepped up. Ultimately, the output will reach 1200 track links per hour.

The third bonus is customer savings. A short heating cycle and the fast transfer of hot billets prove noteworthy. By exposing the billets to the air for only a short period of time, scale formation is greatly reduced. End result is cleaner forgings.

Automation also permits forging to closer tolerances. In many cases, these tight tolerances preclude the need for additional finishing. Also, the elimination of a tong-hold space on each billet reduces the gross weight of the stock from 3-4 pct per billet.

Customer Savings — All in all, these factors spell out a big savings in conversion costs. These savings are over and above the money spent by the customer on steel stock.

Increased flexibility is the fourth major advantage of the new system. Automation frees skilled hammer workers from repetitious work. It allows them to spend more time on complex parts that require greater degrees of craftsmanship.

The automated system also releases for other work several hammers which were tied up in long work runs.

On the track-link orders, AmForge will "wear out the dies" for the most economical operation. This will let the company stay a month or so ahead of customer needs.

Long Die Life — Each of the specially-designed dies lasts longer than normal-press dies for several reasons. The fast heating cycle and the improved furnace controls result in superior stock preparation. This means more thorough billet heating. Thus, there's less scale to clog the die cavities.

Another innovation is the adapter block for the die inserts. Dozens of pin holes in this block speed cooling. Along with the usual cooling methods, air is directed against the die's face through these holes.

Finally, the use of an alternate-stage production cycle aids in prolonging die life. This cycle lets the dies cool between impact at alternate stations.

Limitations — The automatic press is most adaptable to fairly symmetrical forgings with no deep cavities. Deep dies increase the possibility of hot metal sticking in the die cavity. This problem is common with normal forging work.

Due to the special tooling needed, a rather lengthy set-up time is a must for the new press system. As a result, large work runs prove most economical.

For certain types of forgings, the automated complex can be operated semiautomatically. This allows the company to take advantage of the high-speed capabilities of the forging press.

In semiautomatic work, the automated furnace and the special transfer equipment still work together to bring the hot billets up to the press. But from this point, operators manually pass each billet through a normal three-stage die. Then trimming and coining work takes place at separate stations.

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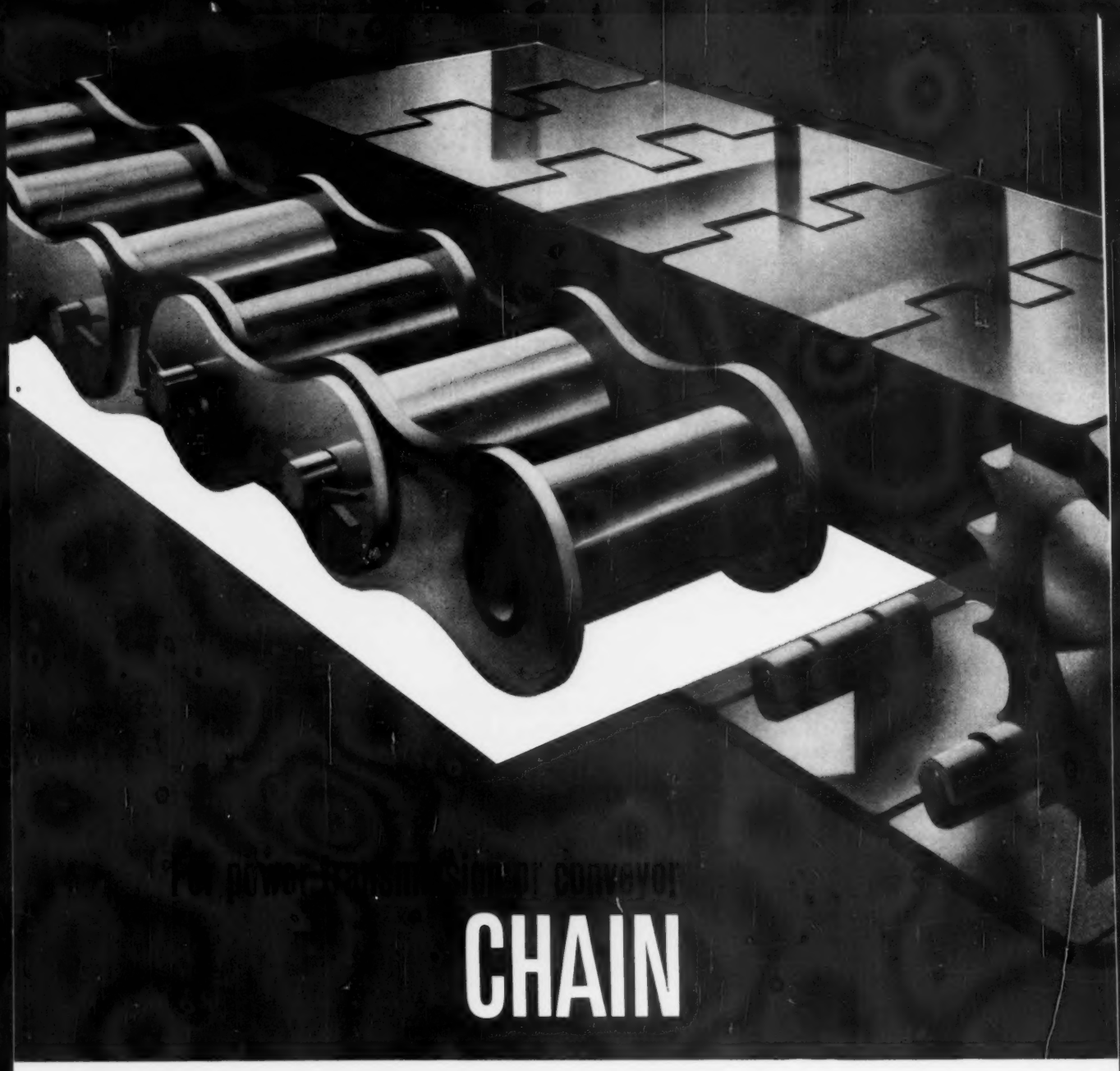

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Starting with the placement of the Sideboards in the mold, no crane is necessary except on the very large ingots. There's no interruption in pouring—pour straight up to the top. The ingot is single stripped, goes to the soaking pit quickly. All these steps reduce time and reflect in overall cost.

If you want more sound steel from every ingot, Soffel's Exothermic Sideboards will give it to you. Test them in your plant soon.

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- Eliminate permanent and conventional hot tops.
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- Sideboards are easily placed in head of mold by one man — crane only necessary on very large ingots.
- Longer mold life — less mold cost — less mold inventory to carry.

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NEW PATENTS

Taconite Binder

Briquetting granular material, W. G. Ekdahl (assigned to Johns-Manville Corp.), Mar. 21, 1961. An improved binder for taconite-ore concentrates consists of gelatinized corn starch and either ball clay or a mixture of kaolin or attapulgite with swelling bentonite, hectorite, or other water-swelling clay. U. S. 2,976,162.

Prevents Foaming

Steel manufacture, P. Metz (assigned to A.R.B.E.D., Soc. Anonyme, Luxembourg, Luxembourg), Jan. 3, 1961. In the refining of cast iron by top-blowing with a dephosphorizing agent suspended in an oxidizing gas, incipient slag foaming is detected by observing any decrease in infra-red radiation intensity. Then the operator lowers the lance and prevents foaming. Canadian 612,056.

Steel Ingots

Method and means for making steel ingots, J. O. Griggs, Mar. 28, 1961. This patent covers an apparatus and method for continuously casting steel ingots and moving them into a blooming mill. The need for reheating is eliminated. U. S. 2,976,586.

Clean Ore Fines

Method of cleaning iron ore fines, for the manufacture of improved ferrous coke, C. Jully (assigned to Houilleres du Bassin de Lorraine, Merlebach, Moselle, France), Dec. 20, 1960. In the cleaning of blast-furnace dust or other iron-ore fines, the material is roasted to 800°C or higher in the absence of air. Then, it's washed with water to eliminate impurities. The result is a product well suited for making ferrous coke. No. 2,965,473.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Slide Rule Estimator

Here's a handy item for tooling engineers, toolmakers, and purchasing agents. At a glance, steel customers can readily determine the weight and prices of the company's steels. "Scales" cover high-speed steels, die steels and a complete line of regular tool steels. (Latrobe Steel Co.)

For free copy circle No. 1 on postcard

New Cadmium Dip

Announcing the development of a new product, a fact sheet cites its advantages for brightening and protecting cadmium in a single dip. The product can be used for bulk treatment of cadmium in a horizontal plating barrel. It produces brightwork without staining in the rinsing operation. At the same time, it offers corrosion protection. (Conversion Chemical Co.)

For free copy circle No. 2 on postcard

Details Die Grinders

A brochure, just issued, describes a new, heavy-duty die grinder. Complete descriptions, full specifications and part numbers for each model make up the contents. The tool itself accepts heavy-duty carbide burrs. Interchangeable long- and short-spindles are also available. (Cleco Air Tools)

For free copy circle No. 3 on postcard

Casting Production

An 8½ x 5½-in. booklet presents the highlights of a recently-completed, automated casting-production line and streamlined finishing facilities. It shows how the firms' modernization program has advanced all their casting services in terms of cost savings and improved quality. (The Chicago Hardware Foundry Co.)

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Testing and Cleaning

Foldout literature briefly describes a variety of products for non-destructive testing, research, quality assurance and ultrasonic cleaning. It includes information on fluorescent penetrants, temperature-indicating paints, radiography, electrical-ceramics, research furnaces and ultrasonic testing and cleaning equipment. (Princeton Div., Curtiss-Wright Corp.)

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All About Valves

Two methods for determining the flow characteristics of a line of valves are presented in a newly revised bulletin. Section 1 covers the fundamental method of determining pressure drop in lubricated-plug valves. Section 2 offers a rapid method of estimating the pressure drop through venturi-type valves. (Rickwell Mfg. Co.)

For free copy circle No. 6 on postcard

Heat-Treat Furnaces

A data sheet informs readers on a series of seven furnaces, originally designed to meet Air Force specifications. The furnaces have box-type construction with chamber temperatures of 2000° and 2300°F. (Lucifer Furnaces, Inc.)

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Measuring Unit

In eight pages, a 4-color brochure deals with a device that measures and records roundness, flatness, roughness, scratches and flaws and total-surface profiles. Included are

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **5/11/61**

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FREE LITERATURE

full-color reproductions of typical-profile records, showing a wide variety of surfaces. (Micrometrical Mfg. Co.)

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Oral Resuscitator

New literature illustrates and describes an oral resuscitator that eliminates mouth-to-mouth contact in rescue breathing. The unit consists of a mouthpiece, breather tube, one-way valve and a flexible face mask. It mounts on the wall in hospitals, public buildings, industrial plants and lifeguard stations. (Mine Safety Appliances Co.)

For free copy circle No. 9 on postcard

Tool-Bit Catalog

Now available is a new catalog covering a line of high-speed tool bits. Three standard grades are discussed. The information includes typical analyses, recommended uses, sizes, standard-package quantities and prices. There's also a grade selection guide. (Firth Sterling Inc.)

For free copy circle No. 10 on postcard

Air-Cleaner Efficiency

Explaining why the soiling effect of air is a useful index to its dust content, a handy reference sheet also explains how this index is used to determine the efficiency of air cleaners. One side of the sheet discusses the U. S. Bureau of Standards Dust Spot Test. The reverse side references other booklets on electronic air cleaning. (Westinghouse Electric Corp.)

For free copy circle No. 11 on postcard

Relief-Grinding Aid

New literature describes a relief-grinding fixture. The colorful brochure shows how to use this fixture to grind any type of drill. It also discusses cam-relief grinding, grinding flutes and setups for sharpening taps. (Harig Mfg. Corp.)

For free copy circle No. 12 on postcard

Axle-Lathe Bulletin

An informative 10-page bulletin tells all about new, dual-end-drive, truing and axle lathes. It gives information on design and operating features, optional equipment and complete machine specifications. (Farrel-Birmingham Co., Inc., Consolidated Machine Tool Div.)

For free copy circle No. 13 on postcard

Forms Ribbon and Wire

In two colors, a fully-illustrated catalog describes the engineering features and production capabilities of automatic, high-speed ribbon and wire-forming machines. Ribbon and wire parts, such as clips, clamps, hooks and rings, are also shown (The Baird Machine Co.)

For free copy circle No. 14 on postcard

Patching, Ramming Mix

Data on an improved basic-patching and ramming mix, for use in open-hearth steel furnaces, is available in a new folder. It informs the reader on cold-crushing strengths, product analysis — including physical and chemical composition, and presents a brief discussion of installation methods. (Kaiser Aluminum & Chemical Sales, Inc.)

For free copy circle No. 15 on postcard

Open-Web Steel Beams

New and complete, a 1961 catalog covers open - web steel joists, corrugated centering and formed-roof deck. Its 28 pages offer easy-to-read charts of properties and dimensions as well as isometric drawings to illustrate various types of bridging, anchoring and accessories used in joist construction. (Ceco Steel Products Corp.)

For free copy circle No. 16 on postcard

Multiple V-Belt Drive

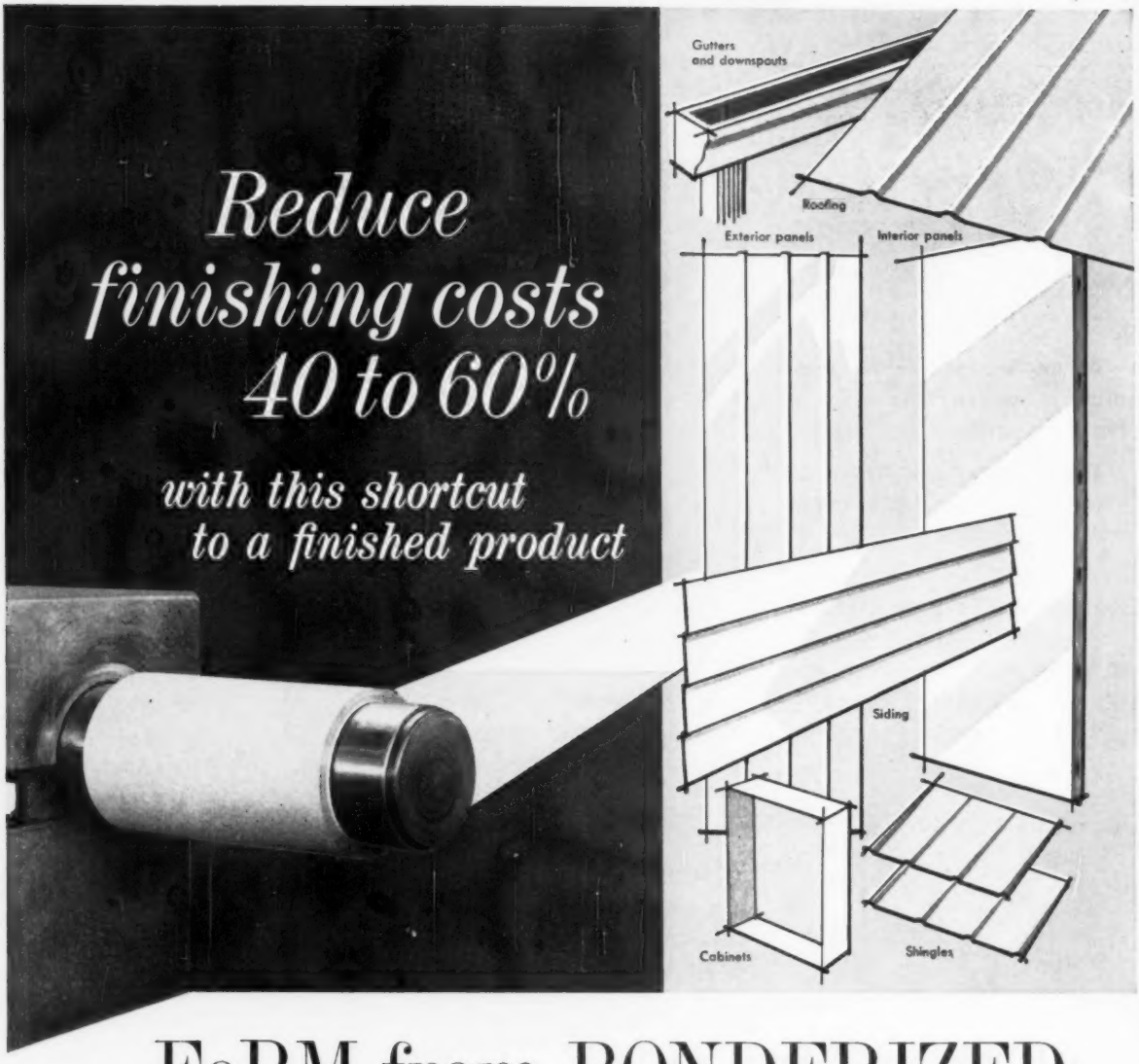
An engineering and specification guide presents complete instructions and engineering data to ease selection of stock and custom v-belt drives. (Fort Worth Steel & Machinery Co.)

For free copy circle No. 17 on postcard

Spade Drills

In six pages, a new catalog covers a line of inserted-blade spade drills and spade-drill holders. It lists dimensions and prices for three standard types of blades. It also describes blade holders, coolant connectors and grinding fixtures for the drills. Special blade styles are illustrated. (Erickson Tool Co.)

For free copy circle No. 18 on postcard



FoRM from BONDERIZED painted coil stock

Actual field experience and careful cost projections by manufacturers indicate that finishing costs can be cut 40 to 60% by using pre-painted coil stock. This is true for products formed from steel, aluminum or galvanized, using baked-on, high quality paints over Bonderite.

These spectacular savings result from decreased paint consumption and application costs per thousand square feet of surface.

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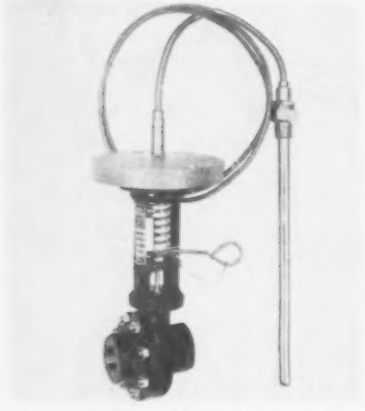
Previews Highlight New Ideas At Design Engineers Show

Be on the lookout for these displays as you take stock of the items at the Design Show.

The latest ideas in design engineering may hold the key to increased profits.

Regulate Temperature

To resist corrosion, the body and all wetted parts are stainless steel in a new, self-operated temperature

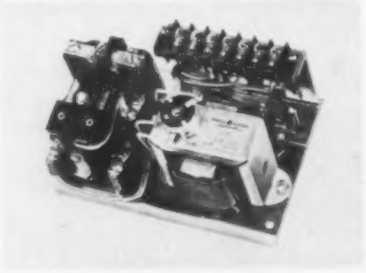


regulator. It handles tough chemical applications and corrosive or erosive conditions. The seats are self-cleaning and self-lapping in operation, to provide tight shut-off and help minimize maintenance. The valve also has a field-removable thermal system in case a range change is necessary in the field. It has 11 ranges to control temperatures from 10°-450°F. (OPW-Jordan Corp., Booth 1202)

For more data circle No. 19 on postcard, p. 121

Relay Controls Tools

Highly sensitive, a transisterized relay has high impedance for stop motion, inspection, sorting, and positioning of machinery. Or, it can be teamed up with photocells, thermistors and liquid-level probes. The big advantage is that it needs no



warm-up time. And, sensitivity is a built in feature of the device. (General Electric Co. Booth 423)

For more data circle No. 20 on postcard, p. 121

Gears for Timers

To help design engineers take advantage of small-parts improvements and cost reductions brought about by automatic-die-casting and plastic-molding techniques, a company will offer on-the-spot design data at its show exhibit. Set up as a value-analysis information center, the booth will display the latest examples of improved small-parts design. Typical of these units are the

timer shafts and gears shown in the picture. These standard parts can be ordered with changes in configuration to meet design requirements. There's little or no additional cost. This is so because of an unusual manufacturing technique that utilizes interchangeable unit dies. (Gries Reproducer Corp., Booth 1143)

For more data circle No. 21 on postcard, p. 121

Signals Filter Change

New hydraulic filters suit most suction lines. They handle flows ranging from 2-250 gpm. Their most outstanding feature is a mechanical pointer that indicates when

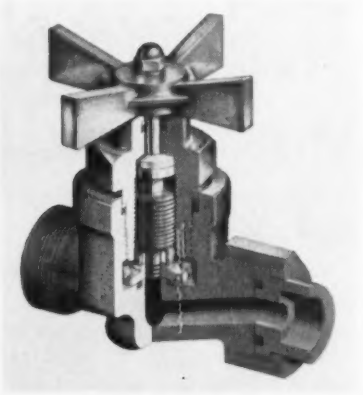
the cartridge should be replaced. The filters are also available with electrical actuation for remote-visual or audible indication. This electrical signal can also be used to stop the pump automatically. (Vickers Inc., a div. of Sperry Rand Corp., Booth 549)

For more data circle No. 22 on postcard, p. 121

Valves and Fittings

New at the show, a line of valves and fitttings suits high-pressure service. Design engineers will have an opportunity to open and close hand-operated valves at 6000 psi, test their leakproof operation and construct a complete piping system, using these units. The soft-seated valves handle liquid or gas. To go along with the valves, there are all

the necessary fittings. Hand-tightened unions, elbows, tees and valve-end connections also provide the

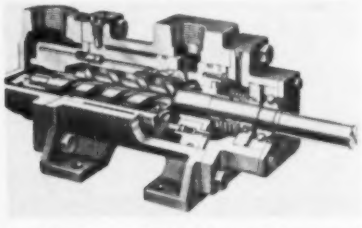


leakproof operation necessary in a high-pressure system. (Combination Pump Valve Co., Booth 805)

For more data circle No. 23 on postcard, p. 121

Rotary-Screw Pumps

This exhibit highlights major design considerations in choosing suitable pump characteristics for power-hydraulic service. The standard pumps in the line deliver up to 3000 gpm at 300 psi, in a continuous, non-pulsating flow. In addition, noise, vibration and hydraulic whine are kept to a minimum. The pumps have proved acceptable for integral mounting on high-speed machinery. Their pulsation-free flow helps to prevent finish errors on broaching jobs. They also serve



on Navy combat ships as fuel and oil pumps. (De Laval Steam Turbine Co., Booth 836)

For more data circle No. 24 on postcard, p. 121

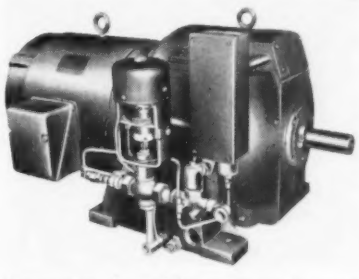
Design With Nickel

How can nickel and nickel-containing alloys solve a multitude of design problems? At the show, an animated display with about 50 examples of the many finishes, colors and textures available in nickel stainless steel, nickel-chrome plating and other alloys will attempt to answer this question. One of the highlights of the nickel-plating section is a comprehensive display of chrominum-on-nickel, die-cast parts for automobiles. This will be supplemented with other electroplating exhibits, such as nickel-tin coatings, nickel-chrome plating and nickel electroforming. Another display covers the use of durable, corrosion-resistant, nickel stainless steel in automobile-wheel covers. (The International Nickel Co., Inc., Booth 529)

For more data circle No. 25 on postcard, p. 121

Variable-Speed Drives

More for the same money is the keynote of the entirely new models in a line of eddy-current, variable-speed drives. More torque capacity results from better use of magnetic materials. The magnetic system that



generates the eddy currents is more efficient. Five model sizes are involved in the latest refinements. Here's a typical example of the increased performance. One unit was previously rated at 40 hp. The new equivalent model rates at 75 hp. (Dynamatic Div., Eaton Mfg. Co., Booth 656)

For more data circle No. 26 on postcard, p. 121

Tests Ferrous Parts

A complete new family of materials for the wet method of visible and fluorescent, magnetic-particle testing has resulted from applied research. The concentrates feature easy handling, mixing and storage, increased fluorescent brilliance, closely-controlled particle size and more corrosion resistance. Certain concentrates are formulated specifically for oil suspensions, others

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Parts-design becomes as flexible as wax when you specify investment casting. With the "lost wax" process, parts may be designed for function...operating efficiency . . . and wearability. Costly machining and assembly operations are reduced and often eliminated. A wide variety of alloys offers better parts performance and cost reductions.

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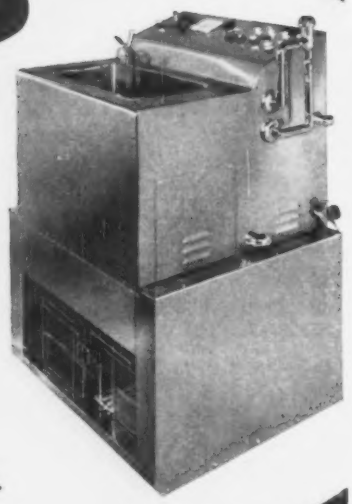

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Paintbond Compounds
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Industrial Washers

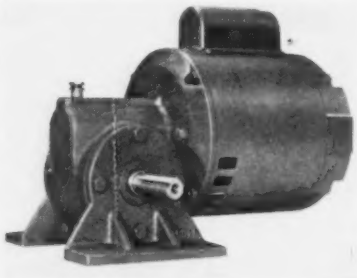
SHOW PREVIEWS

for water. Each has different characteristics. This variety affords a choice of the best material for any given testing situation. (Magniflux Corp., a subsidiary of General Mills)

For more data circle No. 27 on postcard, p. 121

Turns the Corners

An entirely new line of fractional, right-angle gearmotors offers light weight and reversible output shafts. The user can transfer the shaft to the right- or left-hand side of the gear unit, in the field. Here's how it's done. The interchangeable, bearing-housing plates, on each side of the gear head, come off easily. Then the shaft and reduction gear is taken out and inserted on the



other side of the unit. As for weight reduction, the ¼-hp unit weighs only 26 lb. This is 20-lb lighter than the old model. (Master Electric Div., Reliance Electric & Engineering Co.)

For more data circle No. 28 on postcard, p. 121

Bonds Many Materials

New structural adhesives, contact-bond adhesives and printed-circuit adhesives will be on display at Cobo Hall. Along with the structural adhesives, rapid-cure data will illustrate how an increase in cure temperature can greatly decrease cure time. One film adhesive, for low pressure bonding, requires only enough pressure during the curing operation to provide contact between the parts being bonded and to keep them properly aligned. This advantage eliminates the need for elaborate and expensive jigs and fix-

tures to apply the pressure. This property also suits the adhesive for production bonding. (Adhesives Coatings & Sealers Div., Minnesota Mining & Mfg. Co., Booth 550)

For more data circle No. 29 on postcard, p. 121

Gages Push-Pull Force

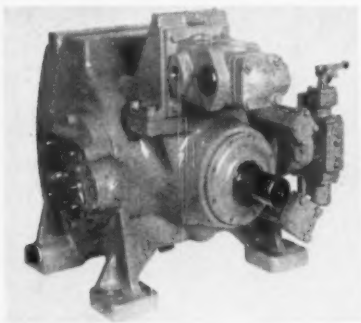
For in-line measurement of tension and compression loads, a new

unit gages both at the same time. And, it does this from the same end or head. The newcomers have split-dial indicators. Push and pull forces may be read directly from the appropriate side of the scale. A typical application for the gage is determining the insertion and withdrawal forces of plug-in electrical connectors. (Hunter Spring Co., a div. of American Machine & Metals, Inc., Booth 857)

For more data circle No. 30 on postcard, p. 121

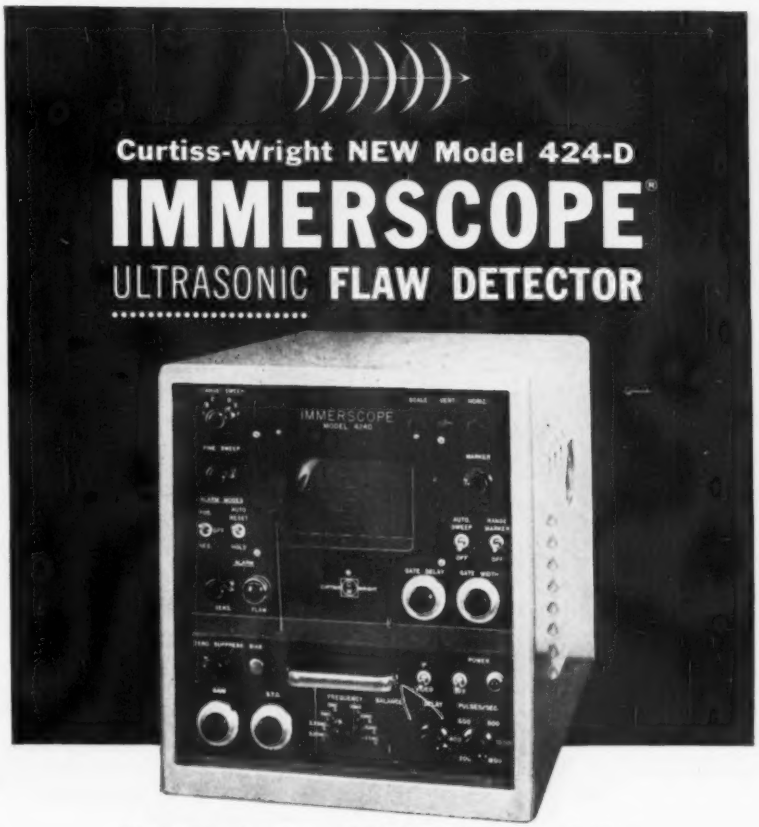
Heavy-Duty Pump

Newly uprated, a variable-delivery, piston pump handles high pressures and large flows. Typical



applications are on heavy presses, cargo winches and other industrial equipment. Pressure rating of the angle-type pump is 3000 psi, continuous, and 5000 psi, intermittent. Overall efficiency at 1200 rpm and 5000 psi is about 94 pct. Any of

NOW! Even Greater Capabilities

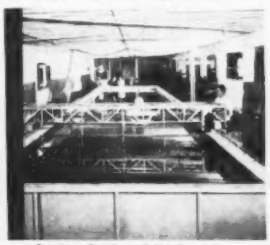


New Features — Outstanding Flexibility

A-Scan Presentation—Unidirectional pip on 7" cathode ray tube
Multi-Technique—Immersed or contact testing, using either single or dual transducer
Exceptional Sensitivity—Full amplitude response to 1/64" diameter defect at 5, 10 and 15 MC for immersed — 5 MC for contact testing
High Resolution—Detects 3/64" dia. defect 0.125" below surface at 10 MC for immersed — 0.040" below surface at 2.25, 5 and 10 MC for contact testing
Dynamic Range—50 to 1 in IF mode, 20 to 1 in Video
Hi-Low Voltage Switching—Enables use of titanate or zirconate transducers
Variable Pulse Repetition Rate—200 pps steps, from 200 to 1200 pps
Video or IF Modes—Choice of maximum sensitivity and resolution or maximum dynamic range
High-Speed Flaw Alarm—Insures positive warning even at highest scanning speeds. Relay provided for controlling external circuits
Sensitivity Time Control—Compensates for attenuation with depth
Noise Suppression—Clips noise and extraneous signals below a controllable amplitude level
Recorder Output Circuit—Provides signal for actuating Electrosensitive Recorder
One Microsecond Video Delay—Enables flaw alarm gate to be positioned closer to video signal
More Precise Control Settings—Additional precision potentiometers simplify setup and adjustment

Manual Package—Model PT1001
Manually operated bridge and scanner, precision manipulator, Immerscope, search tubes, transducers and standard size tank (4' long x 3' wide x 18 in. deep).

Automated Package—Model 503
Electrically driven for pre-programmed scanning. Electrosensitive Recorder, Immerscope, search tubes, transducers and standard tank.



Custom-Designed Packages
Any size or configuration of equipment, manual or automatic scanning, can be custom built to meet specific requirements.
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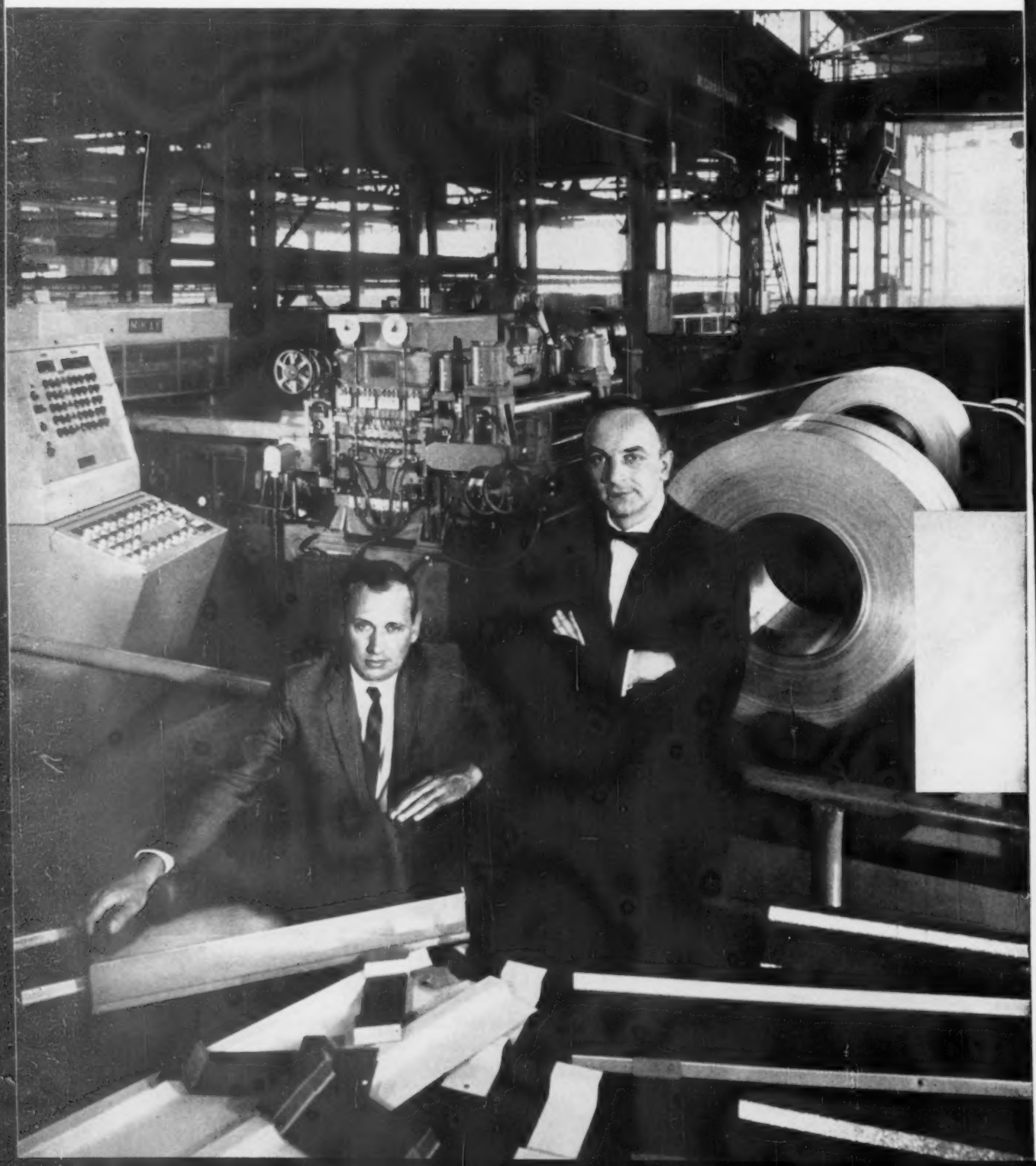
This is McKay

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company —one of the nation's fastest growing manufacturers of pre-engineered metal buildings— examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

Photo by Arnold Newman



Machine....

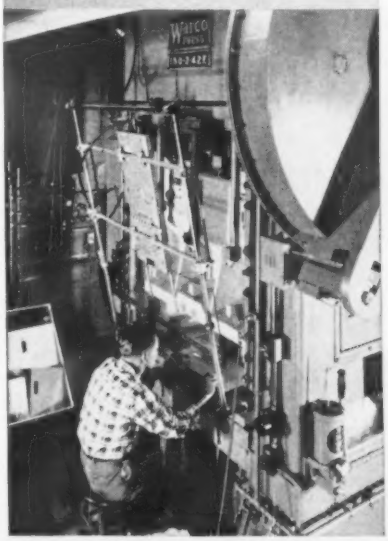
a recognized leader in the development and manufacture of high production metal processing equipment!

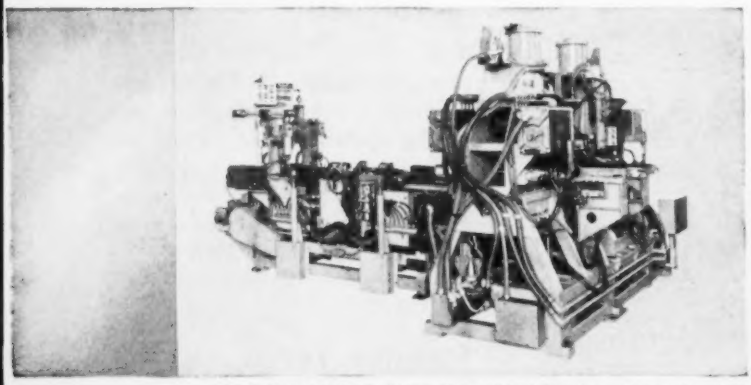
If you fabricate metals and are caught in the "profit squeeze" you'll want to know more about McKay Machine.

It was McKay Machine that pioneered automated integrated production lines, and it is McKay Machine that is today a leader in this field. We have conceived and produced complete lines for the manufacture of building panels, aircraft and missile sections, appliances, cabinets and components, automotive bodies and parts, and farm equipment—lines that are completely automated from *raw material to finished part or product.*

Whatever you make, if it requires metal handling, feeding, slitting, shearing, stamping, welding or forming, it's just good business to acquaint yourself with *McKay Packaged Production Lines*—high speed production equipment engineered to work in unison—with one-source responsibility from start to finish. Write for literature to *The McKay Machine Company, Youngstown 1, Ohio.*

WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship — are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman Kodak.

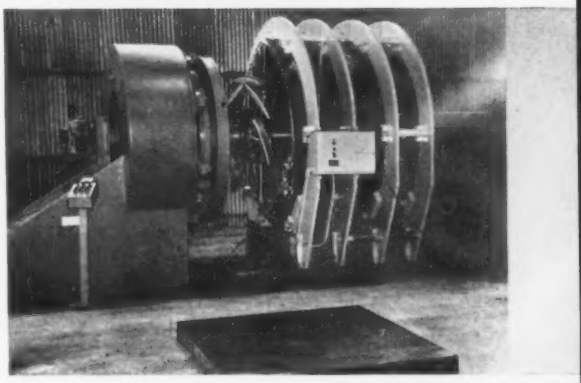




FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

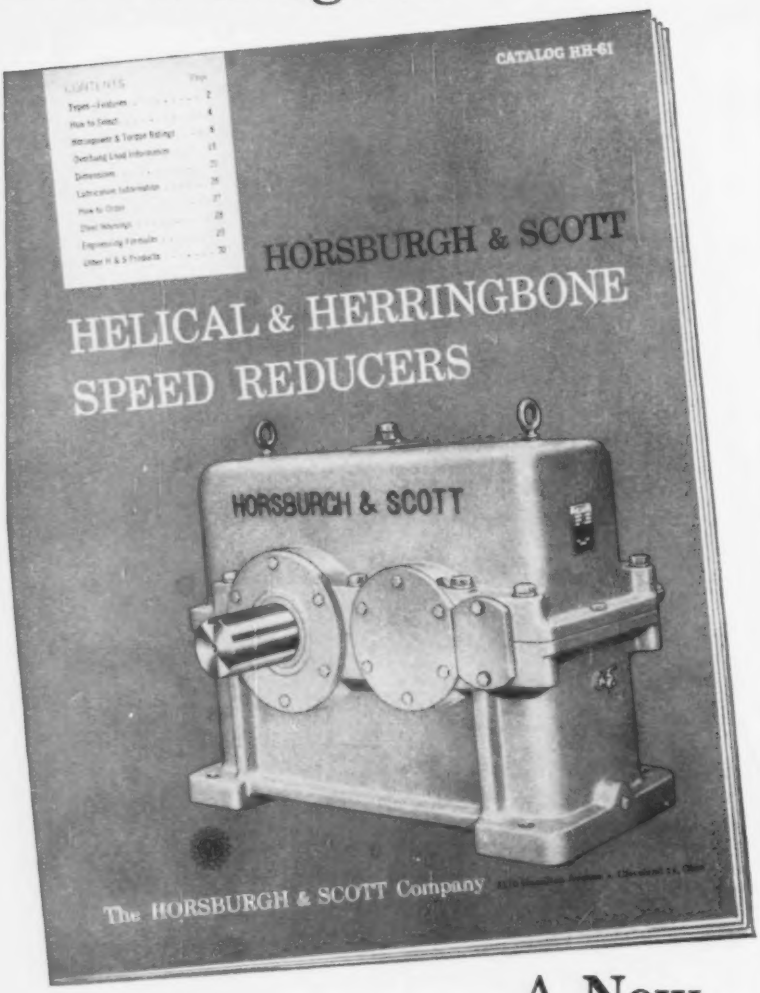
LOOK TO

McKAY MACHINE



BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.

Introducing . . .



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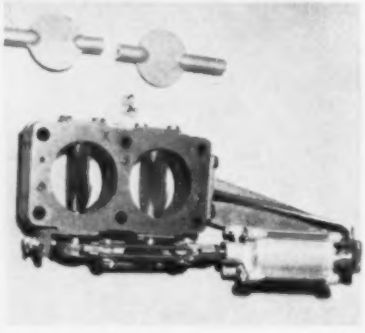
SHOW PREVIEWS

four optional control mechanisms can be added along with an auxiliary vane pump. It mounts on the main pump and delivers oil pressure for the pump-control system and other hydraulic circuits. (Vickers Corp., a div. of Sperry Rand Corp., Booth 549)

For more data circle No. 31 on postcard, p. 121

Stainless Components

Marking the first step in its expanded program of market development, the Alloy Casting Institute, technical association of stainless steel and high alloy foundries, will feature the advantages of cast stainless at the show. For instance, the pictured, butterfly-valve flappers are a one-piece casting. Previously, flappers came from a 3-piece wrought assembly which required two machining operations plus welding. By redesigning them as a high alloy shell mold casting, better performance and lower fabrication costs were realized. (Booth 329)



For more data circle No. 32 on postcard, p. 121

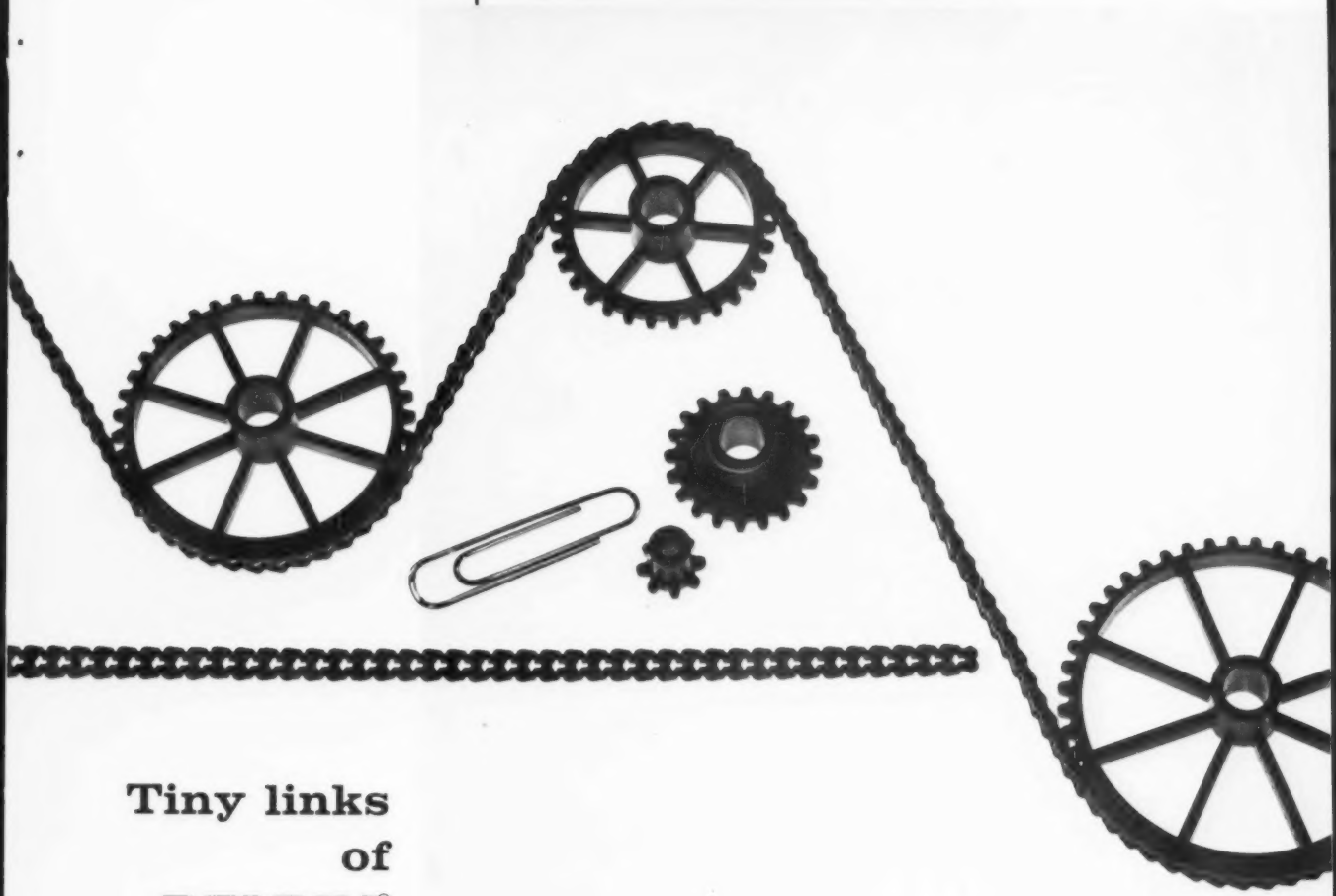
Titanium Tubes

Titanium, one of the so-called "special metals," is an ideal metal for many severe corrosion applications. Its resistance to corrosion means a long life expectancy. This, in turn, points to long range savings that offset initial costs. Titanium tube may be a road to increased profits in the process and refining industries. A tube manufacturer will be ready to discuss this concept at the show. In addition, a complete line of finned and

working with

Du Pont Delrin®

one of Du Pont's versatile engineering materials



Tiny links of DELRIN® make a remarkable miniature chain

These miniature chains and sprockets are significant examples of the way Du Pont DELRIN acetal resin provides superior performance in application areas once reserved for metals. The chain of snap-fit links is made possible by the strength, stiffness and resilience of DELRIN. The need for a master link is, therefore, eliminated, making the chain adjustable in ⅛ inch increments. The chain weighs only 1 oz. per 15 ft.—one-fifth the weight of similar steel chain. It is factory-tested; momentary tension load at 7 lbs.; and running loads to 2 lbs. Manufacturer's service-life tests show a work rate transfer of 0.06 HP for 10 hours . . . 50 foot-tons of work per inch of chain. The chain is solvent-resistant, prelubricated, non-magnetic and non-conductive. These drive components were designed to fill a need in miniature mechanics and instrumentation in a wide variety of high-speed, low-inertia mechanisms.

The manufacturer, Bohannon Industries of Colorado Springs, Col., reports that of the many materials tested, only DELRIN was adaptable to the intricate technology involved in the development of these miniature drive components.

The unique combination of properties offered by DELRIN solve a variety of design problems in areas as diverse as automobile handles and electronic switches. On the reverse side, you will find additional examples of product improvements made possible by this versatile material.

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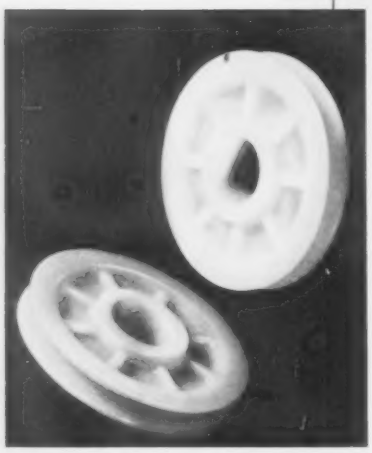
BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY

working with

Du Pont Delrin®

acetal resins

one of Du Pont's versatile engineering materials



Long-wearing parking-brake cable pulleys of DELRIN® are being used by a leading car manufacturer. The full-radius groove in DELRIN provides natural mating, maximum contact area with the cable . . . eliminates the cable pinching caused by split-type steel pulleys. The new pulleys molded of DELRIN have been tested under severe long-term conditions of high load and temperatures.

Jet injector unit for shallow-well system is molded in three parts of DELRIN and joined by two "one-direction" snap-fits, giving permanent assembly. The new unit outwears bronze by a factor of 2 under sand abrasion . . . molded threads utilize high shear strength of DELRIN acetal resin. (Molded by American Molding Company, San Leandro, for Jacuzzi Bros., Inc., Richmond, California.)

Thumbwheel of this unique multi-deck rotary switch is molded of tough, abrasion-resistant Du Pont DELRIN. A single ¼ inch thumbwheel of DELRIN provides the mechanical and electrical insulating properties needed to handle a combination of rotary switches. (Molded by Par-A-Mount Tool & Mfg. Co., Inc., Chesterton, Indiana, for Chicago Dynamic Industries, Precision Products Division, Chicago, Ill.)

DELRIN® has the strength and toughness to meet rugged mechanical requirements

When a part must function reliably under rugged usage, the strength, stiffness and toughness of DELRIN acetal resin may well provide an economical solution. Parts molded of DELRIN retain a high degree of their mechanical properties under numerous conditions, including broad temperature ranges (–40°F. to 250°F.), humidity, solvents and stress.

Already, many hundreds of designs taking advantage of the unique properties of DELRIN, and of the cost savings made possible by rapid injection molding, have been put into commercial production. Why not investigate further with a view to your own products and problems? Mail the coupon below for more information.

POLYCHEMICALS DEPARTMENT

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B
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D
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DELRIN® *acetal resins*

one of Du Pont's versatile engineering materials

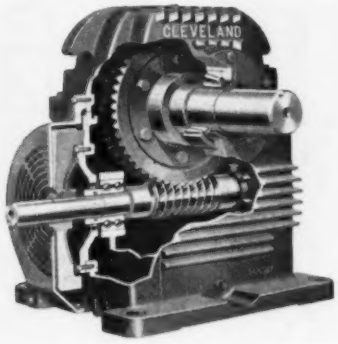
Alathon® · Zytel® · Lucite®

seamless tubes in a variety of metals and alloys will be on display. (Wolverine Tube, a div. of Calumet & Hecla, Inc., Booth 1111)

For more data circle No. 33 on postcard, p. 121

Speed Reducers

A new line of worm-gear speed reducers has single, helical and double-reduction worm types with both horizontal- and vertical-shaft arrangements. These reducers, with sizes of up to 12-in. center distances, come in ratios ranging from 4:1 to 3600:1—ratings from fractional to 175 hp. They also boast a number of attractive features. One of these is a long-wearing worm gear. A special hardening process induces a high degree of

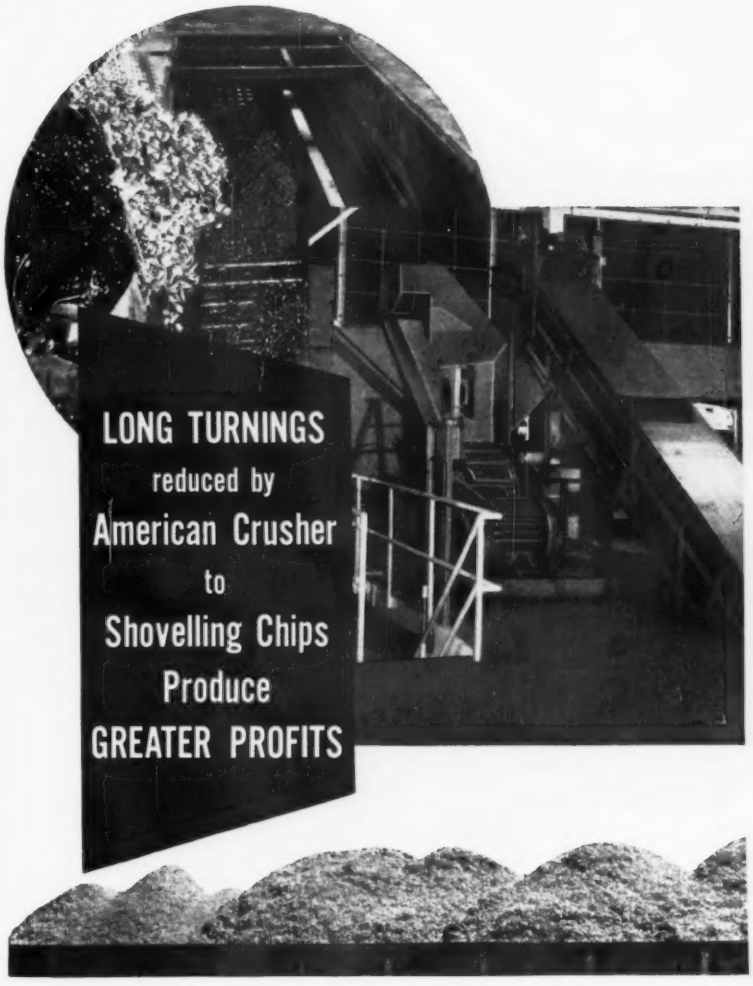


hardness throughout the entire thread thickness to well below the root diameter of the worm. (Cleveland Worm & Gear Div., Eaton Mfg. Co., Booth 656)

For more data circle No. 34 on postcard, p. 121

Variable-Speed Drives

Typical features in a line of selective-speed reducers are illustrated by a new addition. It's an integral-type, air-cooled, magnetic-coupling unit. It has a magnetic amplifier-regulator with generator-feedback speed control. This regulates speed within ±2 pct of the maximum speed. Speed ranges are supplied to meet customer requirements. The unit is available in models with 5-100 hp constant torque, for operation from a polyphase line. There are no electronic tubes to cause



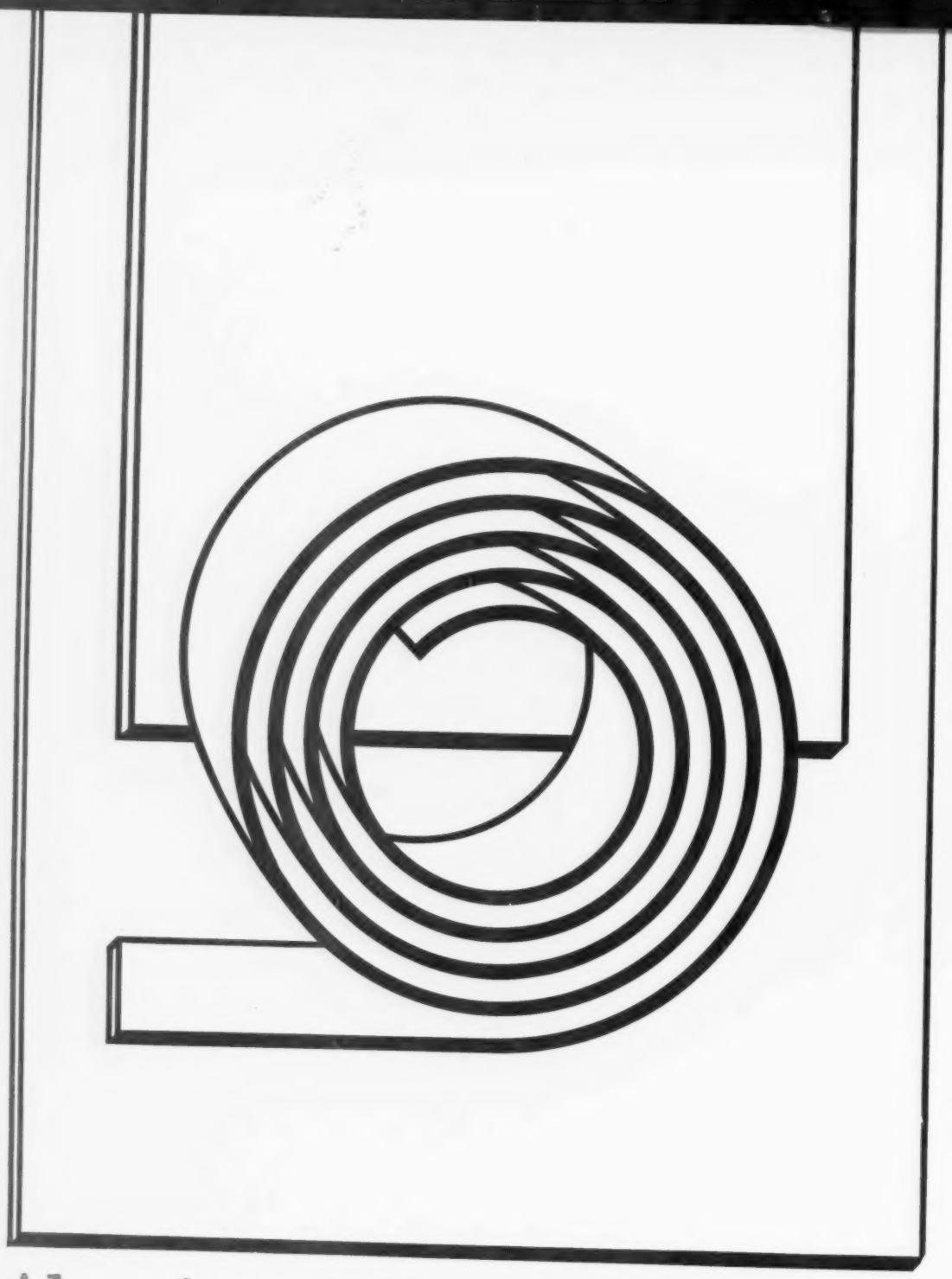
American Metal Turnings Crusher

. . . increases profits . . . improves handling

An almost fully automatic chip salvage system, with an American Metal Turnings Crusher at its heart has increased profits, saved space, and improved housekeeping at a ball bearing plant, conveyors service two rows of automatic screw machines and feed a cross-over conveyor. The cross-over conveyor feeds turnings directly into an American Metal Turnings Crusher which reduces the turnings to uniform sized chips. From the crusher chips are conveyed to a hopper to be periodically discharged into a chip-wringer to reclaim cutting oil. Dry chips drop into a discharge hopper and feed into an air duct which pneumatically conveys the chips to a storage bin at the rail siding.

Literature on American Metal Turnings Crushers is yours for the asking.

American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1439 MACKLIND AVE. ST. LOUIS 10, MO.



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CLearwater 3-6121
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Olin Aluminum produces primary aluminum sheet, light plate and coil in practically all alloys, tempers and sizes in general demand and individually tailors any of these products to the stated specifications of the user. In short, if you want any size of common or heat-treated alloy sheet, you need look no further than your Olin Aluminum Distributor. He has a complete range of sheet, plate and coil in stock and offers shearing and slitting services as well. Just as important is the access you have to the know-how of your distributor and Olin Aluminum's technical services and research. These experts provide a source of information on product design, production and fabrication of aluminum products. We call this "Olin's service in depth." Want to know more? Just call your nearby Olin Aluminum Distributor.

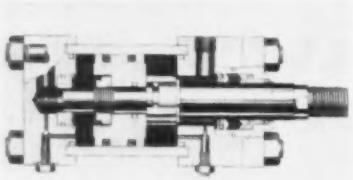
Olin
ALUMINUM
400 PARK AVE., NEW YORK 22, NEW YORK

unscheduled breakdowns. In addition, many mechanical, electrical and control modifications are available. (Century Electric Co., Booth 921)

For more data circle No. 35 on postcard, p. 121

Cylinder Line

One of the most important improvements in a line of air and hydraulic cylinders is a newly designed cartridge rod bearing. The cartridge has a metal rod scraper and a rubber rod wiper. This provides two-

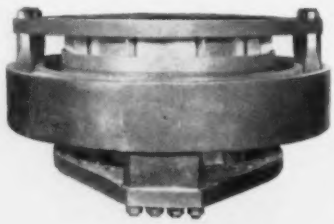


fold protection against chips and dirt which tend to enter cylinders and damage them. For easy maintenance, you can remove the bearing without removing the cylinder from its mount or disassembling it. The cylinder line is offered in 1½- to 14-in. bore sizes, that are intended for 200-psi air and 250- to 500-psi hydraulic service. (Carter Controls, Inc., Booth 1005)

For more data circle No. 36 on postcard, p. 121

Expansion Joints

Gimbal-type expansion joints offer a simple and economical solution to some of the problems created by complex piping and equipment expansion. The units absorb angular rotation in all planes. A structural system controls each gimbal joint. The system consists of two sets of hinges, oriented 90 apart, coupled to a common gimbal ring. This structure restricts the expansion joint to angular rotation in any



plane, absorbs pressure thrust and limits torsional loading on the bellows. If desired, it carries piping weight, wind loads and other dead weights. This eliminates guides, supports, anchors and restraints. (Zallea Brothers)

For more data circle No. 37 on postcard, p. 121

Welded-Steel Tubing

New sizes of electric-resistance-welded steel tubing in round, square or rectangular shapes with heavier wall thickness are now available. They'll be featured in an exhibit at the show. The tubing comes in mechanical and pressure grades. It's also available as cold-drawn tubing. (Ohio Seamless Tube Div., Copperweld Steel Co., Booth 811)

For more data circle No. 38 on postcard, p. 121

Cage-Type Bearing

Dimensionally interchangeable with ordinary needle bearings, a

RA 330® brings the space age **CLOSER**

RA 330 supports rocket cases in pit furnace 10 ft. diameter by 30 ft. deep.

RA 330 provides strength at 1900° F. to support, without fear of dropping, a 3500 pound load; resistance to thermal shock of rapid heating and air quenching; resistance to furnace atmosphere and oxidation.

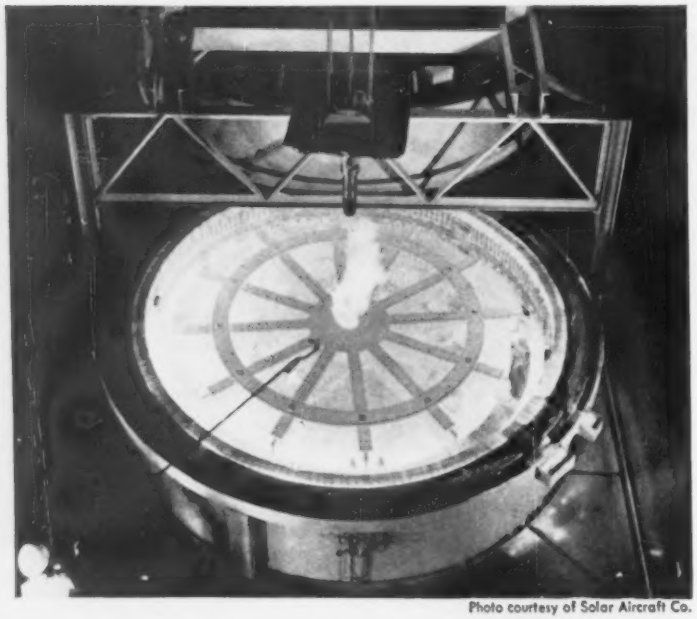


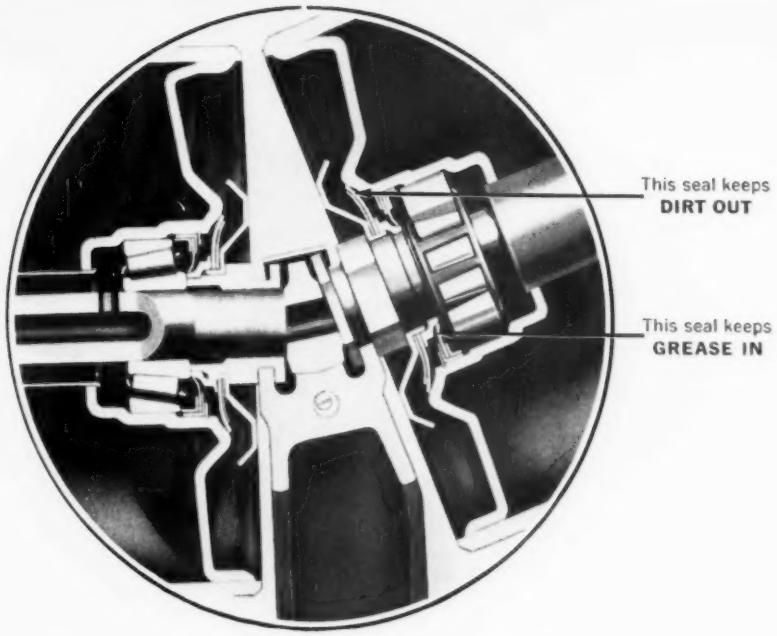
Photo courtesy of Solar Aircraft Co.

Based upon highly successful use of RA 330 in other applications with temperatures ranging up to 2250° F., Solar Aircraft Company selected RA 330 for this critical application.

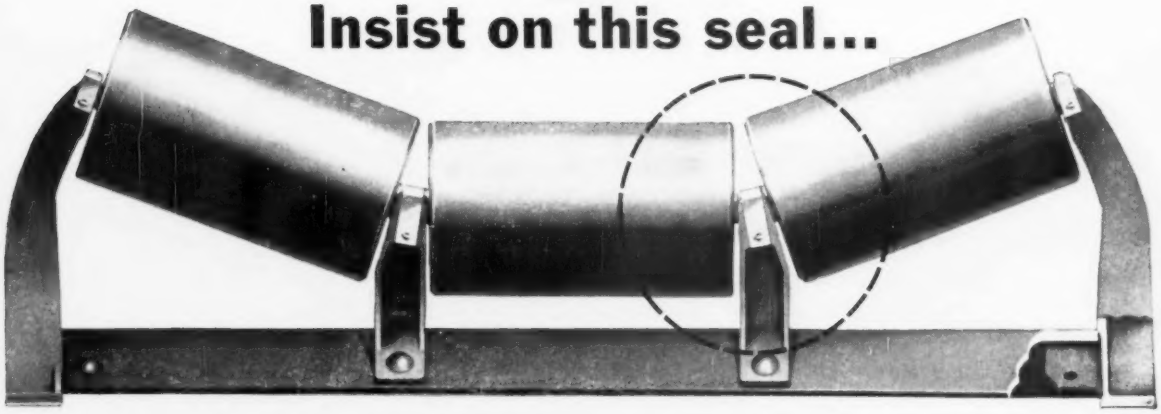
For best performance specify RA 330 for your heat treating fixtures and furnace parts.

Rolled Alloys Heat Resisting Alloy Specialists will gladly be of service. For technical data—send for Bulletin No. 107.

ROLLED ALLOYS, INC.
Heat and Corrosion Resistant Alloy Specialists
5309 Concord Avenue • Detroit 11, Michigan
330 William Street • South River, New Jersey



Insist on this seal...



you'll get longer idler service

HERE'S WHY. Jeffrey designed Permaseal belt idlers for extra-long service in severe applications with an absolute minimum of maintenance. They stay lubricated. Diaphragm *double* seals protect both ends of every roller. Inner seal keeps the grease in; outer seal keeps dirt out.

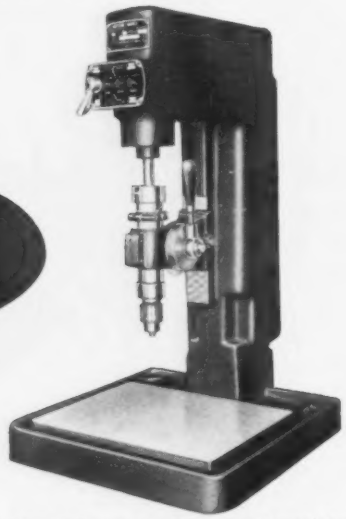
In addition to providing longer, more satisfying service, this positive sealing makes greasing easier when it is needed. You can add grease to either side of a Jeffrey Permaseal® Idler without danger that grease might escape through the other side onto conveyor belts. No grease pipes needed, either.

This extra assurance of satisfying performance through proper seal design is only one of the many reasons you get more dependability over a longer life from Jeffrey Permaseal Idlers. More extras are described in Bulletin 925A. Write for it today, or contact your nearest Jeffrey authorized distributor. The Jeffrey Manufacturing Company, 925 North Fourth Street, Columbus 16, Ohio.

If it's conveyed, processed or mined, it's a job for Jeffrey.

JEFFREY

production drill for precision holes



Avey

Let us show you how to knock hours off your production and precision drilling with this MA-8. Capacity to 3/8". Eight spindle speeds with 10:1 range (variable speeds optional). Hand feed or air hydraulic. 12" swing. Column or bench type. One to six of our famous precision spindles, which give you quiet, vibrationless speeds up to 12,000 rpm. Send for Bulletin 857 or phone us. Avey, Box 1264, Cincinnati 1, Ohio.

MOTORIZED

COIL LIFTER

SAVES
STORAGE SPACE...
HANDLES COILS FASTER ... SAFER

1 Lifter Handles Both Wide and Narrow Coils With Same Speed and Economy

This C-F Coil Lifter, under control of the Crane operator handles hundreds of coils a day in a large mill ... wide, narrow, and of varying tonnage. Fast, infinite adjustments of the motorized legs permit quick pick-up and set-down. Legs can be opened to any width and held ... no need to open to maximum width to handle narrow coil. Maximum of 12" required between coils of any width—saves storage room.

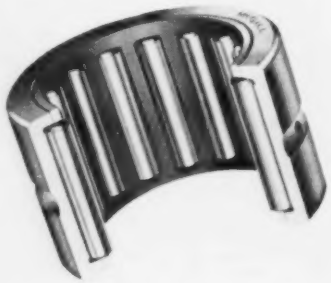
Positive tong grip on coil tightens as lift is made ... insures safe handling. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for Bulletin and complete information.

CULLEN-FRIESTEDT CO.

1303 South Kilbourn Avenue • Chicago 23, Illinois

SHOW PREVIEWS

new unit offers cage-type, needle-roller-bearing construction. Its one-piece, channeled outer race contains

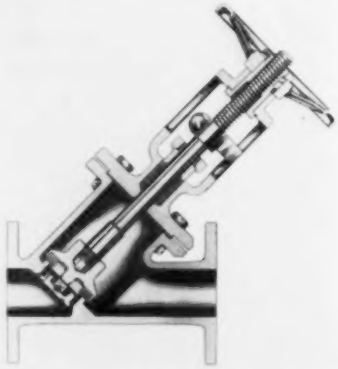


a single row of rollers in a continuous steel cage. The black oxide-finished cage guides the crowned rollers in tapered-pocket walls. This provides balanced roller support that prevents corner wear from edge loading. The units stand up well, even under shaft misalignment or adverse speed and load conditions. (McGill Mfg. Co., Inc., Booth 1031)

For more data circle No. 39 on postcard, p. 121

Regulates Flow

Answering a long felt need of process engineers, a new-type globe valve has a non-rotating stem with a non-rising handwheel and fixed disk. This replaces the conventional rotating stem with rising handwheel and swivel disk. Because of this change, three advantages are claim-



ed. It stops stem vibration and disk chatter. There's no more galling between the stem foot and the disk. The stem can't cut a spiral through the packing. These advantages eli-

HITACHI
a name to remember
in special iron & steel products
The demands of modern living are nowhere more dramatically reflected than in the increasing demand for iron and steel products, and we are proud to be helping to meet that need. Our products include malleable pipe fittings and iron castings; ductile cast iron for use in crankshafts, camshafts, sprocket wheels, etc.; cast iron and steel parts for rolling stock, automobiles and rolling mills; forged steel parts for industrial machinery (rotor shafts, thrust shafts, counter shafts, axles, gears, rollers, etc.); machine tool steels, high speed steels, stainless and other special steels. We are the largest manufacturers in Japan and have exported the above products all over the world.
Hitachi, Ltd.
Tokyo Japan
Cable Address: "HITACHY" TOKYO

Which pre-paint phosphate coating is best for you?

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Undercoat of Oakite CRYSCOAT adds to the looks and life of finishes

From toys to tractors, painted metal products look better and last longer with Oakite CrysCoat under the paint.

CrysCoating—the conversion of a steel surface to a phosphate surface—creates a perfect base for paint adhesion. Paint goes on in a smooth, serviceable coat. Once on, it stays on.

At the same time, a CrysCoated surface prevents the formation of rust . . . even prevents rust spreading from a deep scratch. Both metal and paint are safeguarded. The product looks better, lasts longer.

Oakite has a CrysCoat process to fit every requirement—for iron phosphate or zinc phosphate coatings, for spray washer or for tanks. Is your particular problem one of economy? Durability? Production bottle-neck? For a helpful answer, ask your local Oakite man. Or write for details to Oakite Products, Inc., 26H Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE®

over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning

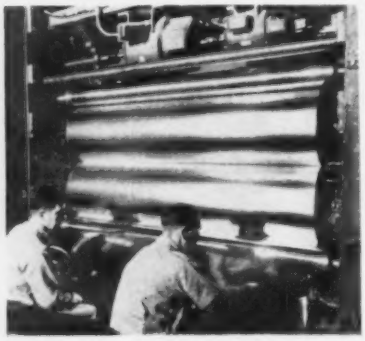
SHOW PREVIEWS

minate expensive trouble spots and promote long life and more throttling control. (Alloy Steel Products Co.)

For more data circle No. 40 on postcard, p. 121

Aluminum Foil

Aluminum foil 72-in. wide, the widest ever made, is now in pro-



duction. It's rolled for use by packaging convertors and laminators. The product offers production economies to convertors and laminators. It allows them to efficiently use wide-width laminating equipment in producing materials for many packaging applications such as cartons, corrugated boxes, multi-wall bags and barrier materials. (Reynolds Metal Co., Booth 215)

For more data circle No. 41 on postcard, p. 121

Sprays Powders

A new assembly increases the efficiency of an arc-spray gun by 20 pct. The modular attachment fea-

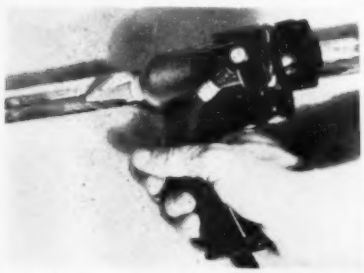
tures two, powder-injection holes that permit more precise control of powder velocity in spraying applica-

tions. Now, the coatings are tailor-made to suit the coefficients of expansion of various substrates. Two powder hoppers enable the use of two different powders. Homogeneous coatings such as tungsten/alumina or nickle/alumina spray on in a matter of seconds. Another benefit of the new dual-powder injection module is the ability to handle finer mesh powders. The advantage is that by using powders in the 1-10 micron range, smoother coatings result. (Plasmadyne Corp.)

For more data circle No. 42 on postcard, p. 121

Halves Brazing Time

Powdered brazing alloys, mixed with a high-viscosity vehicle, offer unusual ease of application. These alloys, in their convenient paste form, also speed the work. For production jobs, they're applied with an unusual air gun. This reduces alloying time by 50 pct. An entire line of brazing alloys comes in the new form, for use wherever the



powdered material was applicable. This includes stainless-steel and high-alloy brazing. The alloys are ideal for high-temperature service. (Wall Colmonoy Corp., Booth 1234)

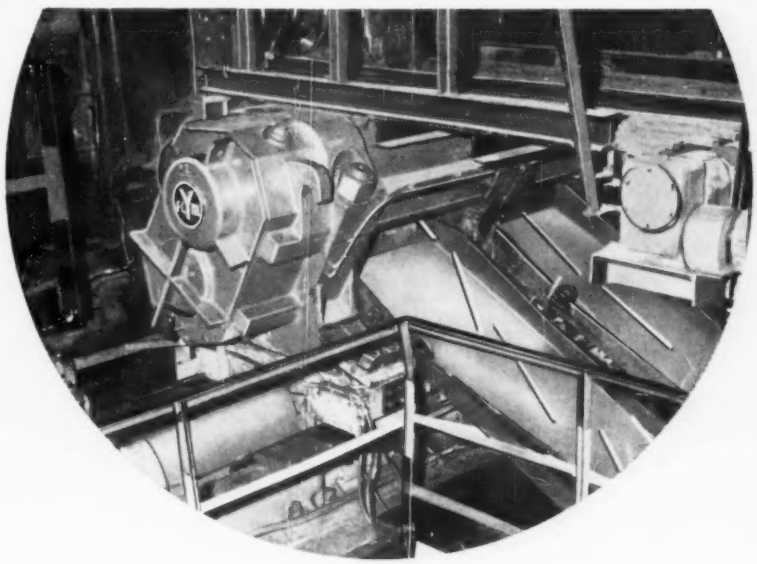
For more data circle No. 43 on postcard, p. 121

Controls Fluid Flow

Precise control of fluids at microflow rates of less than one gph under high pressure requires an extremely accurate metering pump. But when the fluid is also a hard to handle chemical such as nitric acid or aluminum sulphate, the pump must also be capable of operation under the most adverse corrosive conditions. Here's a new unit designed specifically to handle these difficult metering jobs. The pump

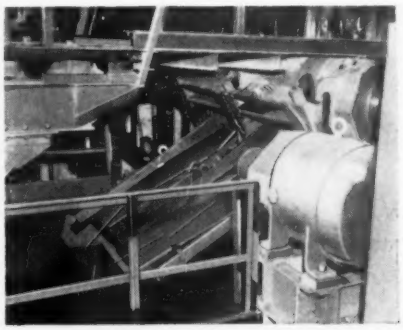
"YOUNGSTOWN"

Rotary-Type PLATE SCRAP CHOPPER



Unique Reciprocating Design prolongs knife life . . . saves downtime

Here's the scrap chopper designed for ruggedness and efficiency . . . built by "Youngstown" for a leading steel company. It handles side trimmer scrap 3" wide, 1/16" to 1/2" thick and cuts to 14 1/8" constant length at speeds of 45 to 180 fpm. This rotary type scrap chopper is also built for 3/4" and 1" thick plate; it can be built integrally with a side trimmer for a new line or application.



Scrap sliding down exit chutes from rotary chopper onto conveyor which discharges into scrap box or railroad car.

The arbor and housing assembly is designed as a separate unit mounted on a motor driven reciprocating carriage. Each arbor is equipped with four 30" long knives, with the knives so spaced that only one side is cutting at a time. This feature, along with the reciprocating action, insures longer time between knife dressings.

This design provides a spare housing and arbor assembly so that knives can be changed or adjusted on the floor, saving valuable mill time while changing knives. Housing and arbor assembly change time is held to a minimum through fast disconnect from drive and reciprocating carriage. Write for complete information.

THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1886

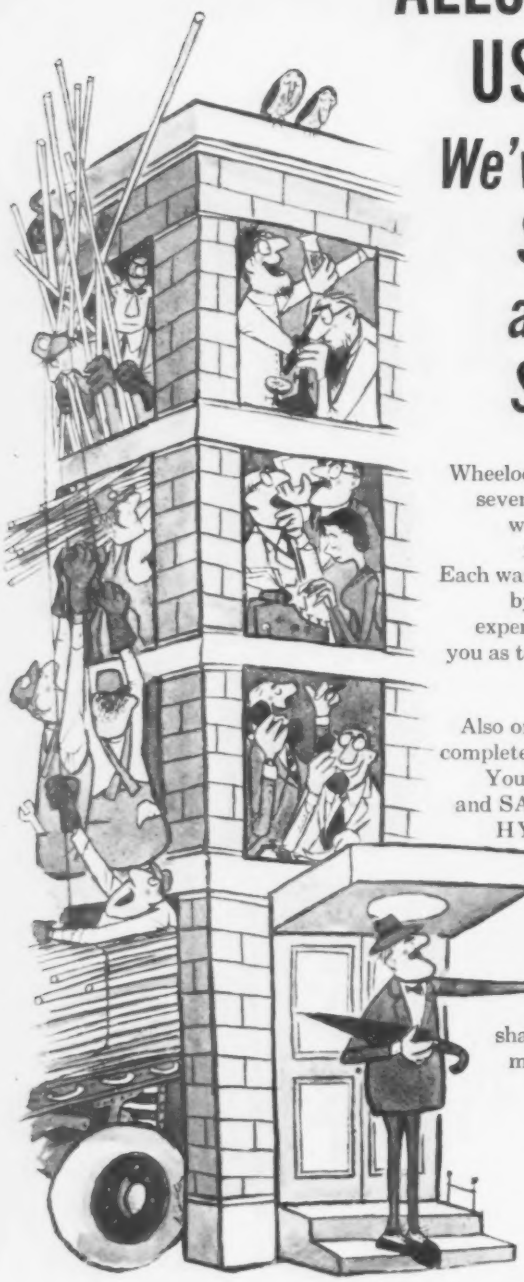
The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

36

ALLOY STEEL USERS!

We've got the STAFF... and the STOCK



Wheelock, Lovejoy maintains seven strategically-located warehouses to serve the needs of its customers. Each warehouse is fully staffed by metallurgists of long experience, ready to advise you as to grades, applications, heat treating, etc.

Also on hand at all times are complete stocks of alloy steels. You'll find standard AISI and SAE steels, and our own HY-TEN steels, offering advanced metallurgical features at competitive prices. You can order your alloy steel — as you need it — in specified sizes, shapes, grades, and treatments. Check the listing below for the W-L branch nearest you.

W-L STEEL SERVICE CENTERS – Cambridge • Cleveland Chicago • Hillside, N. J. • Detroit • Buffalo • Cincinnati
AGENTS – Southern Engineering Company, Charlotte, N.C.; Sanderson-Newbould, Ltd., Montreal and Toronto

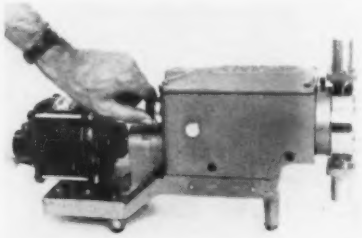
"The Alloy Steel Center"

WHEELOCK, LOVEJOY & COMPANY, INC.

130 Sidney St., Cambridge 39, Mass.

STEEL SERVICE CENTER INSTITUTE

operates on the principle of "isolated-liquid, end-metered pumping." It's a positive displacement, hy-

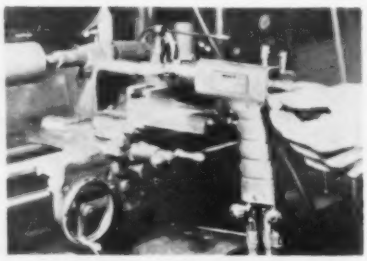


draulically-operated combination piston-diaphragm unit. Field reports show that after five years of operation, involving corrosive fluids, maintenance requirements have been practically nil. (The Carpenter Steel Co.)

For more data circle No. 44 on postcard, p. 121

Sprays Welding Powder

One feature attraction at Cobo Hall will be a new welding spray-gun. It's a medium capacity, high-efficiency design for applying weld powders that hard surface a wide variety of metals and alloys. The new equipment also suits flame



spray metallizing and with a broad range of materials. (Wall Colmonoy Corp., Booth 1234)

For more data circle No. 45 on postcard, p. 121

Design With Castings

Emphasizing the advantages and economies of the casting process, a display features castings made from a wide variety of engineered irons to solve many design problems. Materials selection, ease of design and redesign, and manufacturing methods are a few of the problems that enter the design question. The key

POSITIVE DUPLICATION—EVERY TIME!

With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three PD° surface wheels—as with *all* CINCINNATI PD GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time*!

HERE'S WHY . . . IN 36 STEPS

There are 36 unvarying quality control steps in Cincinnati's unique PD manufacturing process. Right from the start with the choice of the "grains" that go into a wheel, PD procedures involve exacting checks and re-checks. Every grain characteristic—from size, cleanliness, absence of foreign matter, color, magnetic content, to bulk density before and after blending—must fully satisfy extraordinary PD specifications, which are followed throughout in all 36 rigid controls.

RESULT: PREDICTABLE PERFORMANCE

You can depend on the uniformity of PD WHEELS—for each reorder wheel gives you exactly the same good job as the original. Production goes up and stays up. Costs go down and stay down. This is the promise—and performance—of Positive Duplication.

CALL CINCINNATI TODAY

Solve your grinding problems with the help of our Cincinnati-trained specialists. Their wide experience in job set-ups and grinding operations is at your service. Just call your CINCINNATI PD GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

CINCINNATI® GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

to these problems is the capacity of the individual foundry to offer a variety of engineered irons to meet the specific needs of the designer. (Hamilton Foundry, Inc., Booth 744)

For more data circle No. 46 on postcard, p. 121

No More Backlash

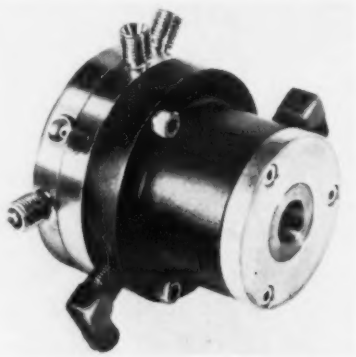
Backlash on these ball-bearing screw assemblies is normally 0.001-0.005 in. How do you get rid of this play? Providing interlocking dog stops on the nut mating faces

prevents rotation. A spring washer surrounds the stops and preloads the nuts. In addition to reducing the diameter of the nuts and lowering the cost of the assembly, the new design provides more exact preloading. The spring washer exerts a constant load, regardless of wear. (Saginaw Steering Gear, div. of General Motors Corp.)

For more data circle No. 47 on postcard, p. 121

Mixing Module Unit

An attachment, which greatly increases the versatility of a company's three arc plasma-spray guns, has recently been introduced. The new unit provides a downstream mixing chamber into which a variety of liquids, solids or gases may be injected and mixed with the plasma. This adapts the gun to a variety of unusual uses. For example, with the attachment, the guns can simulate re-entry testing of material or rocket-exhaust effects. High-temperature, materials-screening tests and chemical synthesis on a pilot model basis are also possible. (Plasmadyne Corp.)

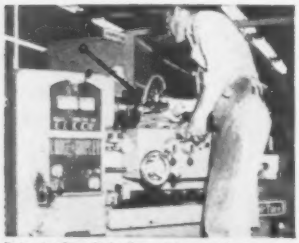


For more data circle No. 48 on postcard, p. 121

Checks Trueness

Used on a jig grinder or surface grinder, a unit checks trueness of parts. In runout, it is accurate to less than 10 millionths. In concentricity, accuracy is less than 20 millionths. The unit sets up in vertical or horizontal position. In this way, it checks rings, castings, parts, instrument and missile parts. A variable-control motor allows the operator to check parts more accurately with both hands free. Equally-spaced indexing of 2-3-4-6-8-12 or 24 combinations are possible. Working under power, a spe-

continued on p. 148



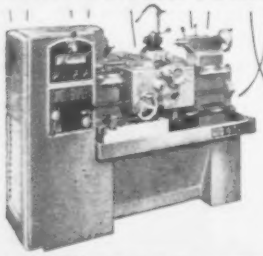
Dalmotor Div., Yuba Consolidated Industries . . . "used in model shop for turning, facing and boring all sorts of experimental parts."

Raytheon Manufacturing Co. . . . "used for turning, facing and boring operations on brass, aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10") Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3073 Colerain Ave., Cincinnati 25, Ohio.

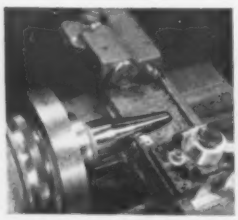
THEY'RE ALL TURNING TO Hi-Turn



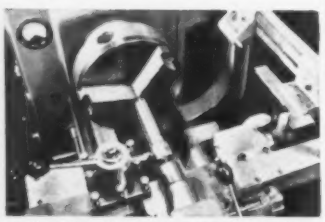
. . . your Lodge-ical choice

Lodge & Shipley

Rocketdyne Div., North American Aviation . . . "held OD turning to a tolerance of .0003" "



Leading glass manufacturer . . . "unheard of economy, ease and speed of production" on machining and reworking glass bottle tooling.



Indiana Gear Works . . . has earned a reputation of "excellent for high production."

Two new Durasafe models—

For greater protection . . . easier acceptance

Here are two new Durasafe safety glasses that will help make your eye safety programs *work*. Both give workers the type of protection they need, want, and will wear. The plastic and metal Safemaster (F5300) was designed for safety Rx as well as plano lenses. The Flexi-Fit (F9900), which fits 85-90% of plano users, helps you cut plant stocks of sizes, is also available for Rx. Both models give you major Durasafe features.

For better wearer acceptance and greater eye safety, check these durable new Durasafe models. Call your AO Safety Products Representative, or write for bulletin S-1524.

Only AO Durasafe gives you:

Sturdy frames—engineered for industrial use and exposures.

Wider temples, endpieces—stronger, more comfortable, better appearance.

7-Barrel hinges—40% stronger at temple's most vulnerable spot.

Duragrip screw construction—temples stay tight, screws cannot fall out.

Cool side shields—nonreflecting wire mesh.

Choice of temples—wide plastic comfort cable, metal core plastic spatula, or aluminum with plastic spatula tip.

Your Surest Protection . . . AO SURE-GUARD Glasses

American Optical
COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

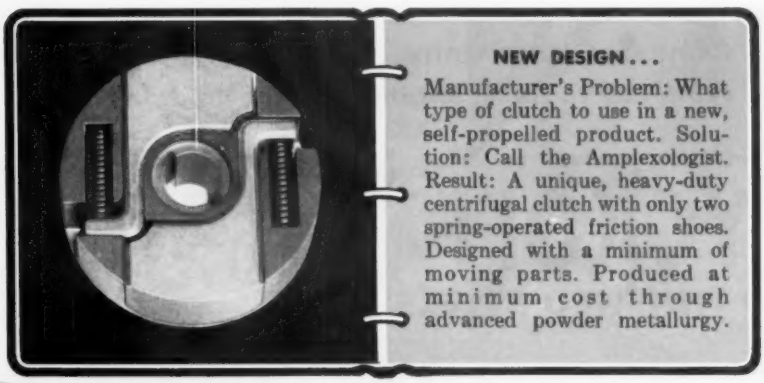
THE AMPLEXOLOGIST

...ASKS FOR TROUBLE!

Funny thing. Many manufacturers get stand-off*ish* when you ask for an order. But when you ask for trouble they're very cooperative. Problems, they'll give you plenty of. Yet, according to the Amplexologist, a problem is the next thing to an order.

How so? Well, most manufacturing problems today revolve around cost and quality. How to keep one down and the other up. And that's the Amplexologist's specialty. Time after time he has replaced machined structural parts with precision powder metal parts that often cost no more than a rough casting and require no machining at all. Saves as much as 90%. Frequently improves product performance, too.

We're happy to report that the Amplexologist—by asking for trouble—has won many friends. Many customers, too. In fact, asking for trouble has helped make us the world's largest and most experienced producer of powder metal parts. Another reason leading manufacturers say: **When it comes to powder metallurgy, Amplex has the answer.**



NEW DESIGN...

Manufacturer's Problem: What type of clutch to use in a new, self-propelled product. Solution: Call the Amplexologist. Result: A unique, heavy-duty centrifugal clutch with only two spring-operated friction shoes. Designed with a minimum of moving parts. Produced at minimum cost through advanced powder metallurgy.

AMPLEXOLOGIST

AMPLEX

DIVISION CHRYSLER CORP., DETROIT 31, MICHIGAN

A CHRYSLER OILITE® PRODUCT

Choose

the Right Steel for your Operation from the Complete Range of

WYCKOFF Cold Finished Steels

Be Certain of:

Faster Cutting Speeds
Longer Tool Life
Optimum Machinability
Superior Finish
Constant Uniformity
From Bar to Bar . . Shipment after Shipment

SPECIFY THE FINEST QUALITY . . .

WYCKOFF
COLD FINISHED STEELS

COLD FINISHED STEEL — Controlled CARBON ALLOY LEADED SPECIALS — STEEL SERVICE CENTER INSTITUTE — Steel

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WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12½" x 2½" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

cial slip clutch prevents jamming or breaking of gears. Controlled wear maintains a true-running table. (M & M Tool & Mfg. Co.)

For more data circle No. 49 on postcard, p. 121

Eliminates Chips

A new thread-forming insert eliminates chips during the tapping operation. Instead of cutting the thread, the insert forms threads by means of narrow, threaded lands in the insert. The thread angles are designed so that they cause the metal to flow around the insert as it is driven in. The insert is ideal for use in such areas as aircraft and electronics. It also opens up new design possibilities in many areas where designers could not use self-

tapping inserts because of the chip problem. Manufactured of C1018 steel, casehardened and cadmium plated, they come in sizes from #4 through 5/16-in. diam. (Groov-Pin Corp., Booth 1221)

For more data circle No. 50 on postcard, p. 121

Needle Bearings

An improved type of needle thrust bearing uses a glass-fiber-filled nylon retainer. Nylon reduces the undesirable sliding friction inherent in all-steel, needle thrust bearings. The use of nylon also provides greater life with negligible retainer wear. Add these advantages to high strength and stability and you have a very efficient thrust-handling unit. All nylon's inherent qualities are present. This means light weight, non-magnetic and noise-dampening features. The bearings come in any combination of

Separate motors are attached to each wheel of this 150-ton LeTourneau Jungle Destroyer with BERYLCO beryllium copper bolts.

On land, under the sea, and in space...

BERYLCO® BREAKS DESIGN BARRIERS

Extraordinary properties and performance characteristics of beryllium metal and its alloys have enabled BERYLCO to assist designers in practically every industry. Creating new products or re-designing existing products, you'll find, as many others have, that checking into the possibilities of BERYLCO metals and alloys is a wise move.

Key parts like bolts for the individually-powered wheels of LeTourneau equipment, components in guidance systems for missiles like the Atlas, and heavy-duty springs in submarines provide higher part performance because of properties found only in beryllium alloys. Good conductivity, formability, high fatigue life, corrosion resistance, and heat resistance are a few of the advantages found in BERYLCO alloys that offer the solution to many material problems.

Write for latest technical information on how BERYLCO beryllium alloys can help you break design barriers. BERYLCO specialists have for over 30 years been helping to turn design possibilities into performance realities.

Visit the BERYLCO Booth #520 during the Design Engineering Show

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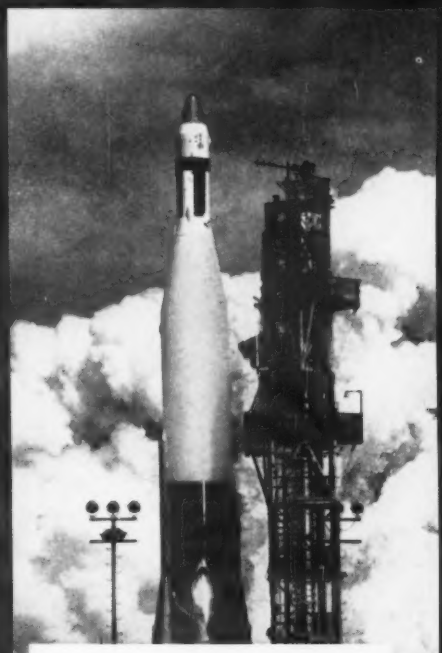
THE BERYLLIUM CORPORATION

READING, PENNSYLVANIA



BERYLCO beryllium copper contacts assure reliability in guidance system circuitry of Atlas missiles.

General Dynamics Photo

BERYLCO beryllium copper springs helped solve a design and performance problem in modern submarines.

bore and OD sizes. (Kaydon Engineering Corp., Booth 137)

For more data circle No. 51 on postcard, p. 121

Tracing Attachment

Here's an attachment that converts a vertical turning and boring machine into a contour-turning lathe. And, it does this at a remarkably low cost. The compact attachment mounts to the ram or turret of the machine. Or, depending on the particular machine, it may be installed in place of the side head. The tracing unit is hydraulically operated, using a servo-valve and cylinder principle. It comes with slide assembly, tracer, template rail and hydraulic power unit, including all lines and fittings. (True-Trace Corp.)

For more data circle No. 52 on postcard, p. 121

from the makers of
MILWAUKEE WROT WASHERS

In this difficult economy, nobody has time for sales gimmicks or jests. So this is neither. We simply want to *prove* to you, Mr. PA, and to your cohorts in Administration, Engineering and Production, that *Milwaukee Wrot Washers* are your best buy.

Washers are important products . . . particularly when unusual types, produced to precise standards, are wanted "yesterday" for important jobs. *This is our proposal:* Next time you run into a REAL PROBLEM with washers or fasteners, get in touch with us. Bet you we can solve it, pronto. You be the judge!

P.S. Of course, we also appreciate no-strain orders for ordinary types of washers, which our 129,000+ washer dies can probably handle easily.

PURCHASING PERSONNEL . . . Free samples available. Request on your letterhead, mentioning types of washers your company uses most frequently. Or write for Washers and Stampings Catalog 40-B.

WW/6/6061/MP

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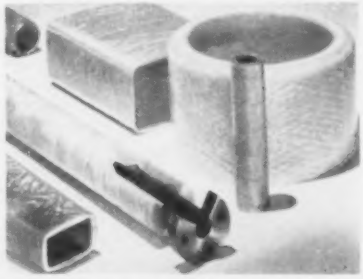
WORLD'S LARGEST PRODUCER OF WASHERS

Filament Wound Tubing

Want a tubing with the exact ratio between burst and tensile strength that's best for your particular application? This glass-filament, wound-epoxy tubing can fill that bill. Continuous strands of glass filaments are bathed in epoxy resin, helically wound and then heat cured. This process produces exact burst- and tensile-strength ratios. The tubing is available in a variety of circular sizes and lengths, or in special cross-section shapes such as rectangular. (Spaulding Fibre Co., Inc., Booth 939)



For more data circle No. 53 on postcard, p. 121

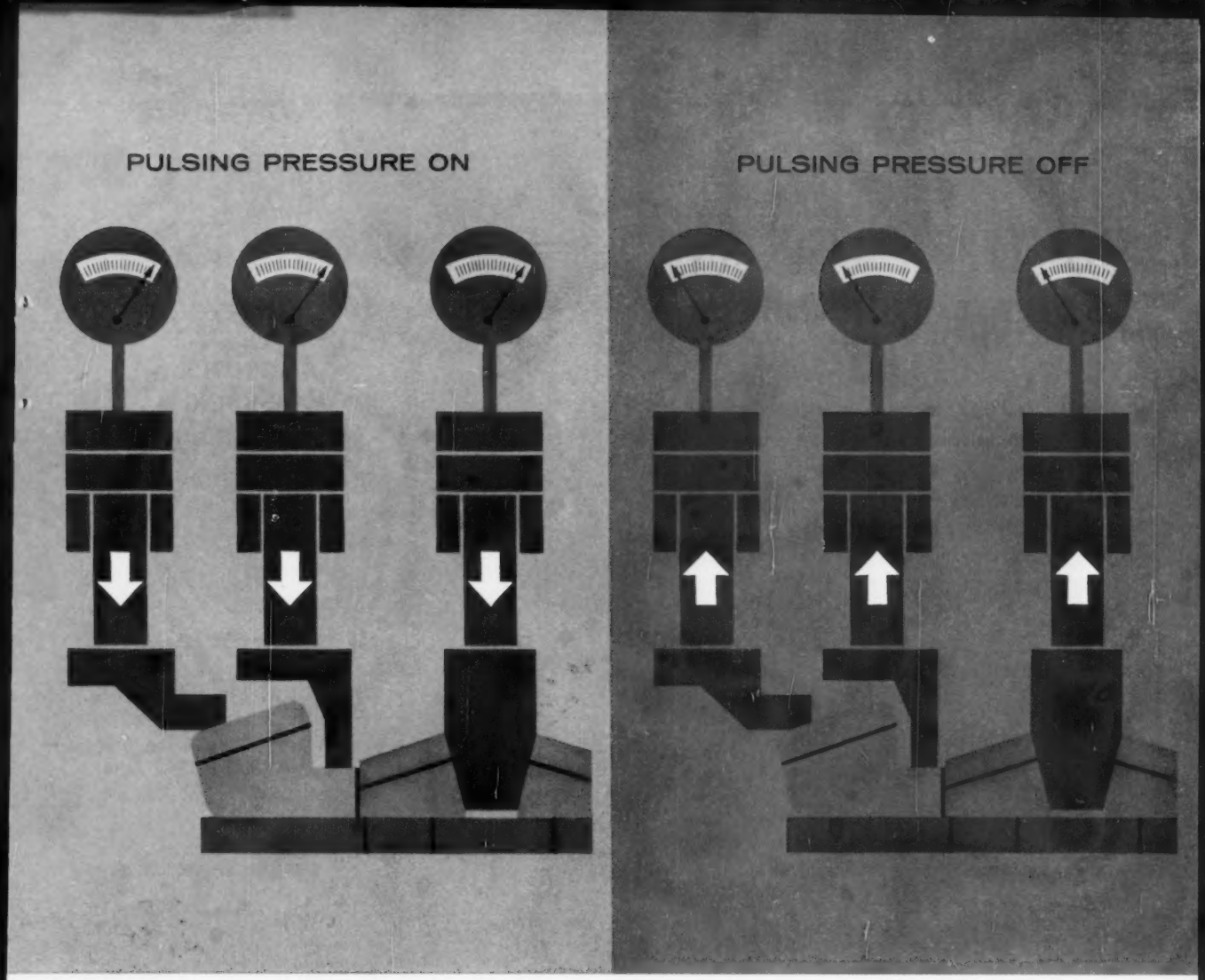
Fastener Materials

Design engineers working in light metals, plastics, wood, copper, iron and steel will find the answers to many fastening and assembly problems at Booth 937 at Cobo Hall. New fastener materials include aluminum, silicon bronze and stainless steel. Special fasteners, sintered-metal and custom-molded, thermoplastic parts will also be featured. A new line of silicon-bronze fasteners is another special. They come in a wide range of sizes. (Russell, Burdsall & Ward Bolt & Nut Co., Booth 937)

For more data circle No. 54 on postcard, p. 121

Solid Urethane Sheets

According to the company, new solid-urethane sheets far exceed the abrasion-resisting qualities of conventional elastomers. Through their use, you can reduce maintenance and installation time because thinner sheets do the job. Another design item of interest is an asbestos-Teflon material. It has a high, thermal-expansion coefficient. But,



New Quenching Machine pulsates to eliminate distortion

The pulsing feature of the No. 529 Quenching Machine allows the use of high pressures to control distortion of parts under quench. Pulsing, which is a way of alternately applying and releasing pressure on the part, allows for the natural contraction of the part . . . and eliminates stresses in the part-die relationship.

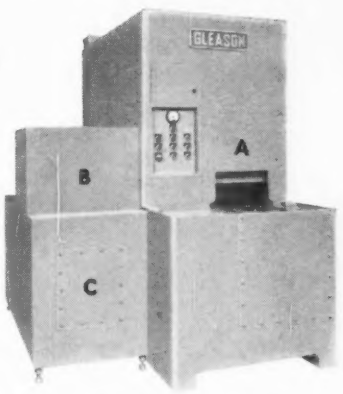
You get tremendous latitude in control of the quench, since as much as 200 gallons of oil can be pumped over the parts.

Simply preset the oil flow with valves and timers, and you have the following automatic cycle: start with a fast quench to set the part, switch to a lower rate; then finish with a rapid quench or vary the sequence any way you wish.

The hydraulic system has a maximum of 1000 pounds of pressure per square inch; a combined total of 50,000 pounds of pressure is available on this machine.

You can handle parts up to 10½ inches in diameter and 4 inches high in the No. 529 Quenching Machine. And it is available in three variations; by adding units as shown in the caption, production is greatly increased.

Drop us a card, and we'll send you more data on specifications and operation.



The basic No. 529 Quencher (A) is manually loaded and unloaded. Automatic unloading (B) is easily added. An auxiliary quench chamber (C) can be added for high production work.

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"3M" TYPE "C" DISCS CUT GRINDING TIME 1/3!

At a 3M representative's suggestion, Mastercraft Metals, Inc., Bellevue, Ky., a leading manufacturer of stainless steel kitchen equipment recently switched from a competitive brand to 3M Type "C" Discs for grinding welds. The result: a 1/3 reduction in grinding time . . . and Type "C" Discs produce a finer scratch pattern that allows easier, faster blending to the final finish.

COST CHECK 5-4-5

Why not let 3M's new COST CHECK 5-4-5 Program help you to effectively investigate ways to lower costs and increase profits. Discover . . .

- If your grinding can be done more economically
- If your finishing is as efficient as possible
- If your polishing can be done faster and better

Send today for a free COST CHECK 5-4-5 Review Form without obligation. Put 3M's years of abrasive know-how at your disposal. Write: 3M Company, 900 Bush Ave., St. Paul 6, Minn. Dept. AAS-51.

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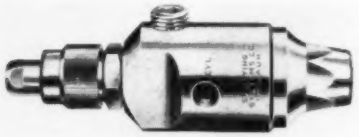
3M COMPANY

that's not all. Over a wide range of temperatures it is inert to most chemicals. Nor, do solvents, lubricants, hydraulic fluids or any of the common fuels affect it. (Aubern Mfg. Co., Booth 540)

For more data circle No. 55 on postcard, p. 121

New Spray Nozzle

An automatic hydraulic spray nozzle has the unusual feature of a clean-out needle that automatically

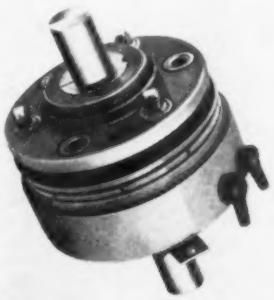


clears the orifice with each on and off nozzle cycle. This is done by the needle, which is an extension of the orifice shut-off valve. Each time the valve closes, the needle moves through the orifice opening to clear out any solid residue that might otherwise clog the nozzle. With a choice of interchangeable tips, the new nozzles are a useful addition to any spraying application. (Spraying Systems Co.)

For more data circle No. 56 on postcard, p. 121

Clutch-Brake Unit

Featured at the show is a new, fractional-hp, clutch-brake package. It's available in torque ratings of 8, 60 and 240 in. lb. The units incorporate a clutch and brake with input and output shaft extensions. They're compact and lightweight. In addition, they permit extremely fast cycling of a load with a constantly-running input. You can interpose the units in a drive system, or they may be coupled directly to both



input and output, depending on the application. (Warner Electric Brake & Clutch Co., Booth 1246)

For more data circle No. 57 on postcard, p. 121

Bits Resist Wear

A new series of tool bits boasts exceptional wear resistance and long life. They're available in two types of steel, both of which are ideally suited for general-purpose work in most materials. They also cut heat-treated steels and other high-tensile-strength materials. (Morse Twist Drill & Machine Co., a div. of Van Norman Industries, Inc.)

For more data circle No. 58 on postcard, p. 121

Filing Versatility

A new, controlled-filing system provides unusual flexibility for rolled filing equipment. Varying tube dimensions fit every size, type or activity of stored materials. The system consists of 4-, 6- and 8-

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tube modules in 4-, 2⅝- and 1⅞-in. diam tubes. Since all modules are a standard width, you can stack any size. The individual tubes are paper-laminated, foil-wrapped units with steel ends. They anchor mechanically in a sturdy metal frame. This prevents their accidental removal. (Hamilton Mfg. Co., Booth 620)

For more data circle No. 59 on postcard, p. 121

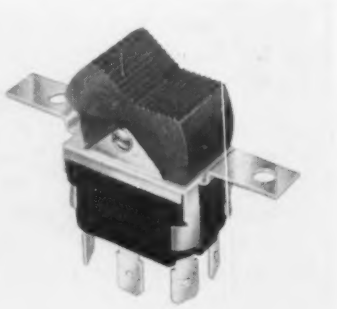
Investment Casting

Several new developments and increased capacity broaden the potential of the investment-casting process. Blades and wheels, products of the investment-casting process with vacuum-melted alloys, will be on display. The alloys give good, high-temperature service in both wrought and cast form. To point up another interesting development, several parts have been chemically etched to show the results of a process that fixes grain size to customer specifications in different areas of a casting. (Haynes Stellite Co., a div. of Union Carbide Corp., Booth 621)

For more data circle No. 60 on postcard, p. 121

Rockers Trip Switches

A new series of rocker-actuated, 20-amp switches features flexibility for adapting to many industrial and

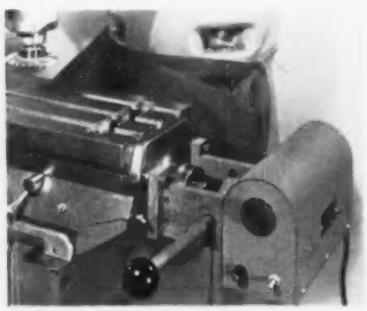


consumer products. In addition to rocker actuation, they boast heavy-duty construction and attractive appearance. The basic switches come with flush or offset 2-hole mounting. Serrated actuators are available in various colors. Models of this line are now being used by several major appliance manufacturers on washers and dryers. (McGill Mfg. Co., Inc., Booth 1031)

For more data circle No. 61 on postcard, p. 121

Fits on Mill Table

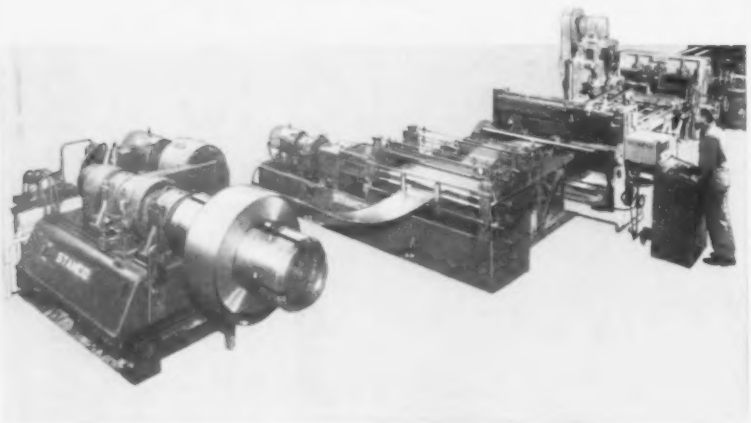
This power attachment for hand-operated machines reduces human errors when machining to close tol-



erances. But that's not all, the operator is free to work on deburring or other work while the machine is cutting. In addition, a special feature allows quick hand operation when power isn't needed. For trouble-free performance, the attachment has

The answer is **Stamco**

for equipment that reduces cost in slitting and shearing operations



The installation of Stamco equipment will help you realize savings in three important areas: inventory investments, time and labor, and reduced waste.

This new shear line is designed to accommodate stock up to 14 gauge, in widths to 48 inches, and in coils weighing a maximum of 20,000 pounds. Accuracy can be held to plus or minus 1/32 inch. It is set up to cut lengths from 14 inches to any maximum length.

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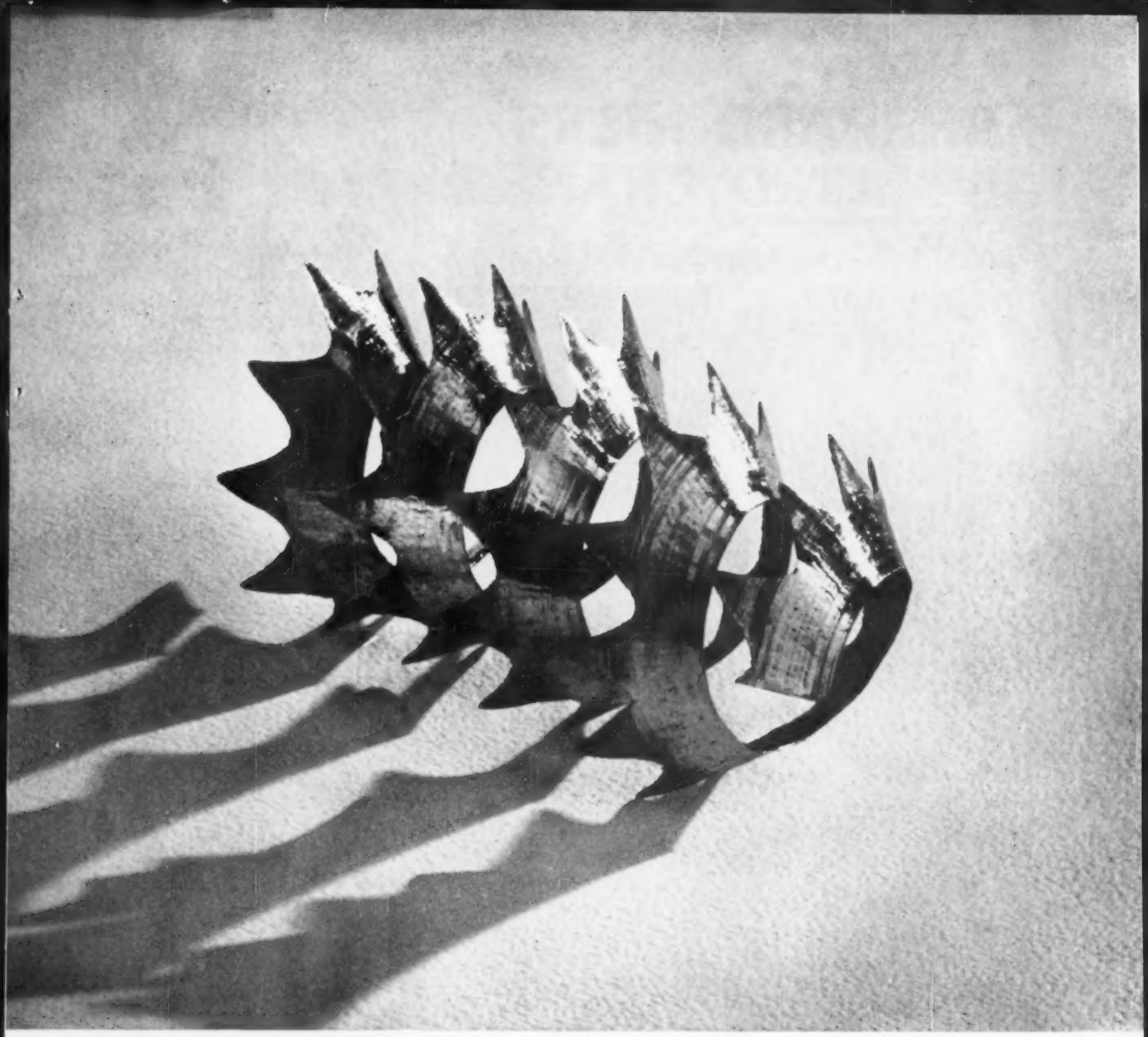


Chip – magnified 4 times – produced by machining Waspalloy with Rex 49

New Rex 49 outlasts other special purpose high speed steels better than 2 to 1

Rex 49 – a new high speed steel that can machine today's "difficult-to-cut" metals *faster and more economically* than existing special purpose high speed steels – is another in the long line of advances and improvements in specialty steels to come from Crucible research.

Crucible laboratory tests indicate that tools made of Rex 49 last as much as 4 times longer than other special purpose high speed steels . . . and it has a base price ⅓ to ½ of these steels.

Both laboratory and field reports prove the advantages of Rex 49 for machining hard, tough or abrasive metals, such as heat-treated alloy steels, stainless, titanium, and superalloys. These tests also indicate that Rex 49 has advantages in machining the more conventional metals through increased speeds, feeds and depths of cut — and Rex 49 can be hardened with conventional high speed steel heat treating equipment.

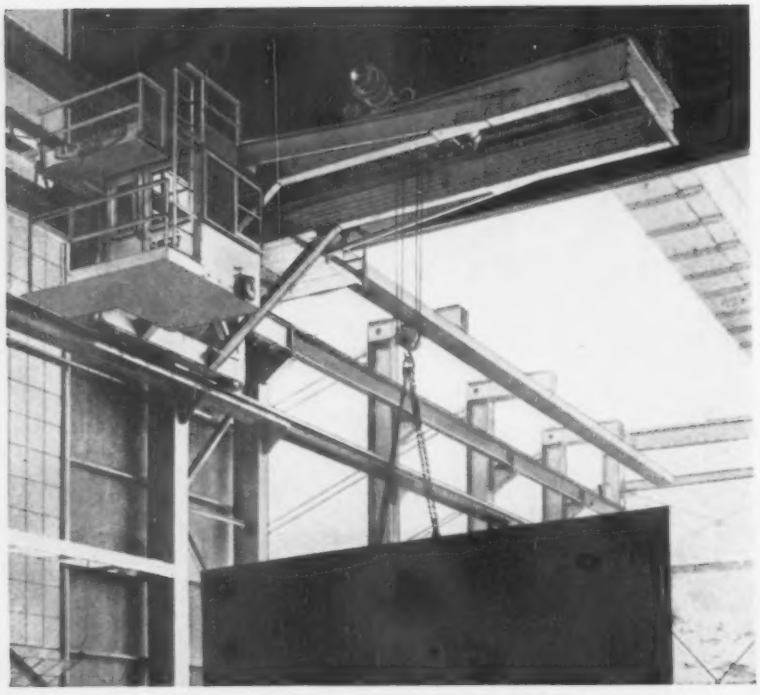
Rex 49 is indicative of Crucible's continuing leadership in the development of improved high speed and tool steels.

For more information, write: *Crucible Steel Company of America, Dept. HE06, Four Gateway Center, P. O. Box 88, Pittsburgh 30, Pa.*

CRUCIBLE STEEL COMPANY OF AMERICA

SHEPARD NILES JOB-MATED CRANES:

DIFFERENT—because each job is different



Shepard Niles Cab Operated Wall Crane

This Shepard Niles Job-Mated QUALITY Crane was specifically designed for the actual job it is doing. Each component – motors, controls, frame, gearing, trolleys, brakes – was designed and built by Shepard Niles to give the best overall crane performance under unique operating and load conditions.

Your load-moving problem will receive this same careful consideration at Shepard Niles. Even in so-called "standard" applications, our insistence on selecting the right components to meet exact on-the-job conditions, results in a custom-built crane. Care like this in our plant means lower operating costs and increased efficiency in yours.

For the full story on how Shepard Niles Job-Mated Cranes can cut costs in your plant, arrange to have a Shepard Niles representative call at your convenience. Or send for our descriptive bulletin.

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America's Most Complete Line of Cranes and Hoists

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1468 Schuyler Ave., Montour Falls, N.Y.

SHOW PREVIEWS

several desirable construction features. A slip clutch protects the motor drive and allows the machine to drive up to a stop. Or, a special limit switch can be added to reverse the motor. The unit attaches to rotary tables, vertical mills, grinders and many other machines that require power feeds. (M & M Tool Mfg. Co.)

For more data circle No. 62 on postcard, p. 121

Stamped Rocker Arm

Here's the only product of its kind that's stamped from a single piece of metal. Cold-worked, the arm offers higher strength to weight ratios. It requires fewer fabricating operations and this lowers unit costs. And, the intrically-contoured rocker arms are available in pro-

duction quantities for the tractor and automotive industries. Another bonus claimed is greater rigidity in all directions. (The Laminated Shim Co., Booth 116)

For more data circle No. 63 on postcard, p. 121

Microfilm Cards

Greater contrast and clarity in third and fourth generations of duplicate, microfilm - aperature cards is a result of a newly-developed card. The new card employs a diazo film with improved performance. It produces clearer images on reader screens as well as sharper prints in most processes. (Minnesota Mining & Mfg. Co., Booth 550)

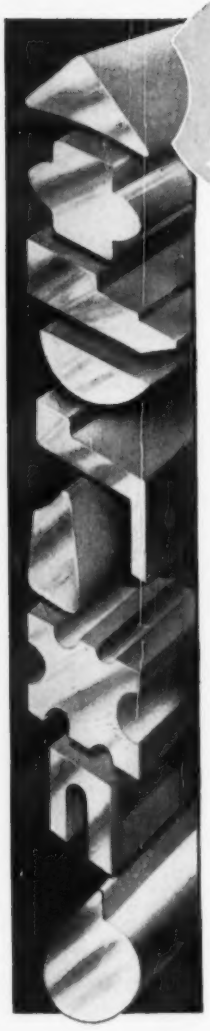
For more data circle No. 64 on postcard, p. 121

Pressure Switches

Improved accuracy, reduced cost and higher proof pressure are ad-

Moltrup Steel

COLD DRAWN



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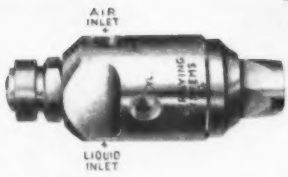
5-3

pneumatic atomizing

SPRAY NOZZLES



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AUTOMATION

Spraying Systems offers a complete selection of automatic pneumatic atomizing nozzles for use where controlled intermittent spraying is required. In-built shut-off valve is air operated. Precision built for exact control of spray type and volume. Compact and easily installed. Write for Catalog 24.

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FOR EASIER SPRAY NOZZLE INSTALLATION in any type of system . . . see Catalog 24 for Spraying Systems Adjustable Joints . . . and Bulletin 93 for the NEW Spraying Systems Split-Eyelet Connectors.

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PORTABLE X-RAY UNITS

Small, portable, high-powered FEDREX units are the most flexible and useful X-Ray equipment ever offered. Their high ma output, long duty cycle and rugged construction are unequalled. Available in 140, 160, 200 and 260 KV units. (160 and 200 KV 360° models also available.) Stepless independent KV and milliampere adjustments over wide ranges permit exact exposure setting without guesswork. Built-in synchronous timer and exposure charts simplify setups and assure accurate results.

Shielding in the X-Ray head reduces stray radiation from all models to 5mr/hr or less at 10 feet. Automatic shut-off controls provide complete overload and flashover protection.

Write for additional information or phone SWinburne 9-0500

CURTISS WRIGHT

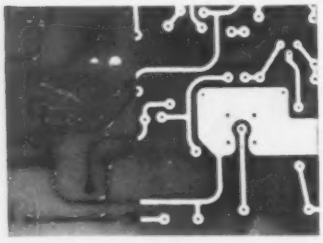
Princeton Division CORPORATION Princeton, New Jersey

In CANADA: Canadian Curtiss-Wright Ltd., 43 Westminster Ave., N., Montreal 28, P.Q., Can.

Straits Tin Report

Chemical tinning enhances the solderability of the conductive paths of printed circuits. Pure tin is deposited only on metal surfaces, including exposed edges; dielectric properties are unchanged.

The new process, using "CUPOSIT LT-26," made by Shipley Co., Inc., Wellesley, Mass., is not a substitute for electrodeposited tin, but it affords protection to the printed circuit board, thereby increasing storage life. "CUPOSIT LT-26" operates at temperatures lower than hot tin dipping, requires no electricity, contains no cyanide.



Bright side of printed circuit shows results of immersion in new chemical tinning process.

Tin Developments

• *Stronger titanium* results from addition of 15% tin. Ultimate tensile strength increases 90% at room temperature.

• *High-temperature brazing filler* metal alloys of tin, nickel, chromium, silicon keep joints strong after long exposure at high temperatures.

• *Low-melting quaternary* alloys of tin, indium, lead, silver are used for cryogenic circuits.

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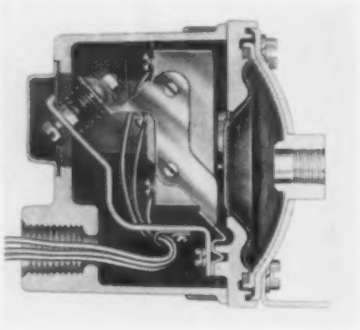
SHOW PREVIEWS

vantages resulting from design innovations in a line of diaphragm pressure switches. Standardizing the body, which houses interchangeable

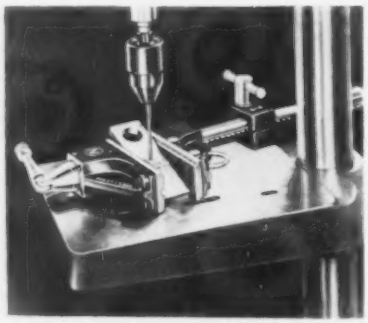


components, permits the use of cost-cutting mass production methods and allows a wide choice in specifications that approximate a custom-made switch. Proof pressures to 600 psi are available; also adjustable ranges from vacuum to 400 psi. The higher ranges facilitate the use of low-priced diaphragm switches on installations where higher-priced switches were previously a must. (Barksdale Valves)

For more data circle No. 65 on postcard, p. 121

Chucks and Vises

Fully-automatic chucks permit tool-changing in just two or three seconds. Teamed up with special drill-press vises, they turn a drill press into a complete machine tool. With this chuck, there's no waiting



for the spindle to stop. Four hardened and ground jaws automatically center the tool and provide a grip that cannot slip or chew up shanks. The greater the load, the tighter the grip. The vise assures positive anchoring on the drill-press table. It floats and locks in any position; holds the work safely for accurate drilling and tapping. It is excellent for angle drilling, as a low-cost jig, or for holding small fixtures. (American Machine & Foundry Co.)

For more data circle No. 66 on postcard, p. 121

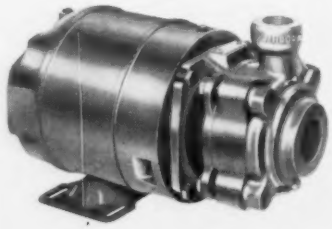
More About Castings

Emphasis is on quality control and close tolerances at this exhibit of light-gray-iron and alloyed-iron castings. The display will be geared to appeal to the designer and the mechanical engineer. The castings range in size from 1 oz to 250 lb. Intricate design, close dimensional tolerances, material soundness and smooth-surface finishes suit them for today's space-age standards. (The Decatur Casting Co., Booth 955)

For more data circle No. 67 on postcard, p. 121

Centrifugal Pumps

Reduced space requirements and faster, easier installation are the

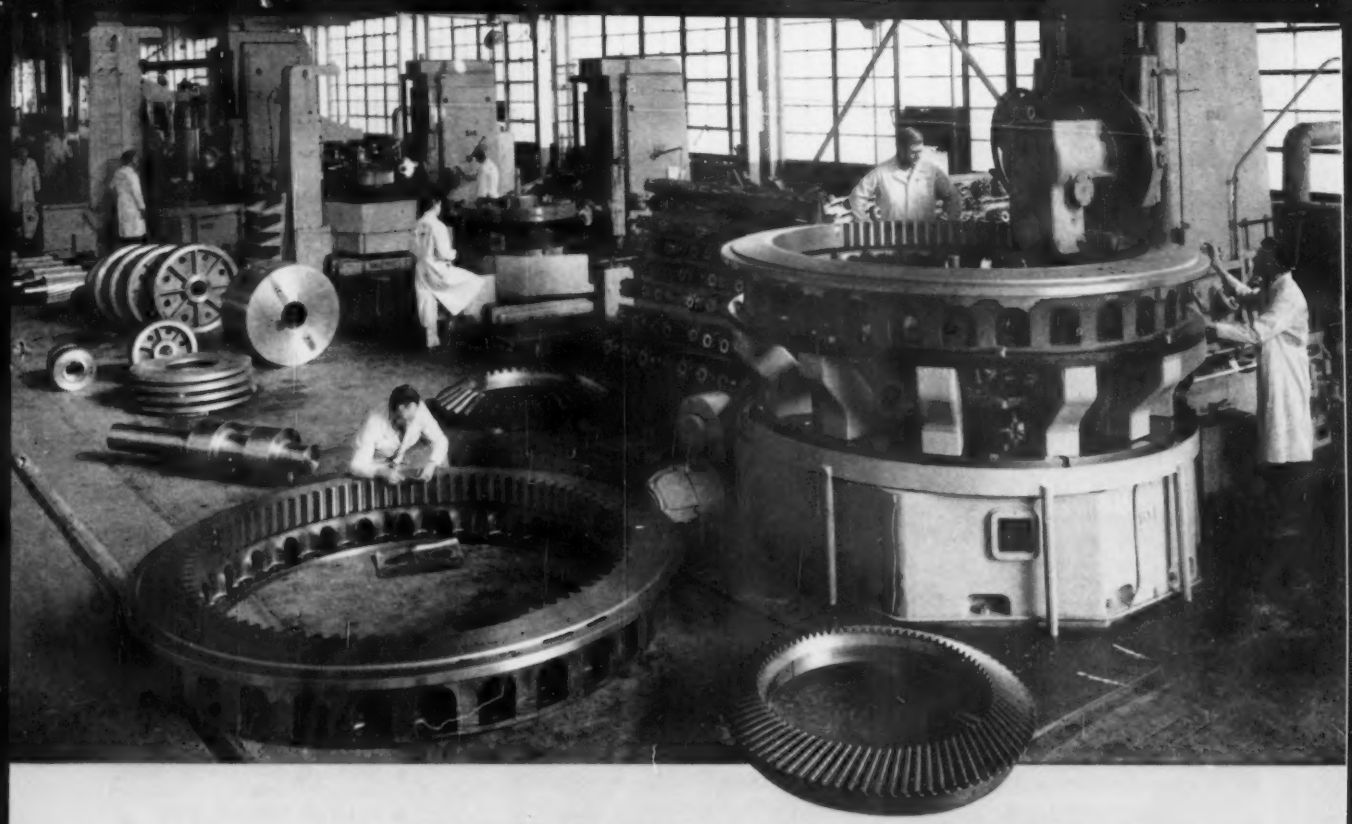


outstanding features of a packaged line of close-coupled, end-suction centrifugal pumps. Unusual compactness and design simplicity make them especially applicable for products such as air-conditioning units, cooling towers, milk coolers, hot-water circulators and general services. (Aurora Pump Div., The New York Air Brake Co.)

For more data circle No. 68 on postcard, p. 121

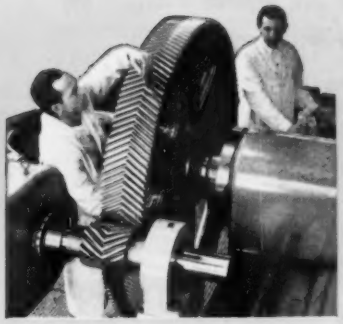
Rounds the Corners

Here's a chain that operates on curves. Its most common use is to provide a transfer medium from one straight-line conveyor to another. When used for this purpose, it usually has standard pin connec-

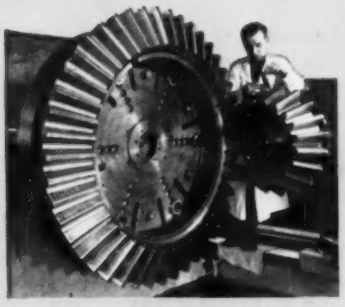


UNCHALLENGED IN QUALITY

ILLINOIS GEARS



Testing Herringbone Gear With Integral Shaft Pinion



Power Equipment for Testing Large "Coniflex" Bevel Gears and Pinions

With every ILLINOIS GEAR comes the *extra dimension of perfection in quality*...quality that has remained unchallenged throughout the world.

Unchallenged because ILLINOIS GEAR goes far beyond the established standards in maintaining relentless, painstaking control of quality that extends through every step of manufacture to final delivery.

And...no matter how great the quantity, one gear or 10,000 or more...skilled craftsmen equipped with the world's finest and most modern tools and precision quality control equipment, make sure that these high standards of perfection are rigidly maintained in producing each and every gear.

For gears that are made right *with quality as the first consideration*—depend on ILLINOIS GEAR.

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SHOW PREVIEWS

tions in every pitch. The usual practice is to incorporate tubing over the pin extensions which act as cross rods. An angular pin enables the chain to function on a curve or circle. Long life is assured since a projected bearing area is built into each strand of chain to resist wear. (Acme Chain Corp., Booth 1004)

For more data circle No. 69 on postcard, p. 121

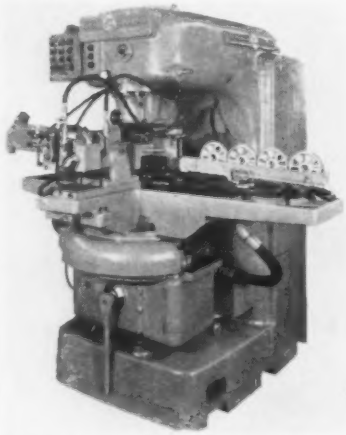
Polyurethane Casters

Special properties of polyurethane give these new caster wheels smoother rolling and swiveling properties, even under heavy loads and over rough floors. The casters resist abrasion, slippage, most acids, dry heat (up to 250°F) and cold (down to −90°F). Their extra resiliency protects floors, loads and equipment. Available in diameters of 5, 6, 8, 10 and 12 in., the wheels take loads ranging from 800-3500 lb. They fit both swivel and rigid casters. (Faultless Caster Corp., Booth 1036)

For more data circle No. 70 on postcard, p. 121

Automatic Loader

An in-line automatic loader promotes straight-line flow of gears through a conventional, rotary-



gear shaving machine. Thus, it serves as a second method of automatically processing gears on automated lines. The new loader is a rocker type, which feeds the work gear into shaving position, from a magazine at the front of the ma-

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chine. The stocks, that automatically clamp the work, are parallel to the front of the machine. After shaving, the work is unclamped. (National Broach & Machine Co.)

For more data circle No. 71 on postcard, p. 121

Hard-Surfacing Alloy

Worn teeth on a chain-conveyor drive sprocket are being successfully reclaimed by hard surfacing. Exceptional control of tooth contour comes from the use of a new hard-surfacing alloy. As a result, there's no need for surface grinding. You can use the reclaimed sprocket in the "as-welded" condition. But, that's not the whole story. The hard-surfaced sprocket lasts five times as long and costs ⅓ as much as a new one. Oxy-acetylene welding accomplishes the treatment. (Wall Colmonoy Corp., Booth 1234)

For more data circle No. 72 on postcard, p. 121

Coaxial Cable

Although flexible, a new, heavy-duty coaxial cable is rugged and wear resistant. It's used with a

high-frequency induction heater. The cable expands the possible applications of induction heating techniques, particularly in hard-to-reach areas. Through its use you can braze tube joints inside airframes, missiles and submarines. Soldering, heat treating, annealing, zone refining, high-temperature tensile testing and hot machining of space-age metals is also possible. The cable itself contains the circulating, water-cooling courses for the work coils. (L. C. Miller Co.)

For more data circle No. 73 on postcard, p. 121

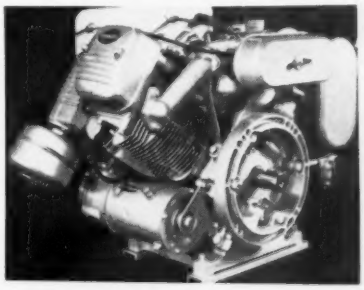
Combination Nut

For applications requiring nuts and washers, a new flange nut combines both in one cold-forged piece. The flanged face eliminates the need for extra washers. It gaps oversized holes, provides extra bearing surface and maintains pressure in vibration absorbers. The combination of features can save much expensive assembly time. (MacLean-Fogg Lock Nut Co., Booth 242)

For more data circle No. 74 on postcard, p. 121

Engines of Aluminum

Two, new, heavy-duty engines of advanced design have been added to a line of virtually all-aluminum

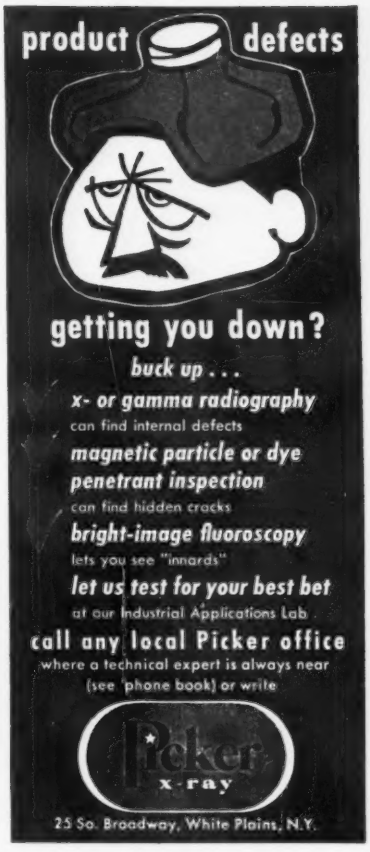


engines. The engines can serve as the power source on equipment such as pumps, welding units, compressors, portable, motor-generator sets and utility vehicles. Except for highly-stressed and moving parts the engines are all aluminum. As a result, they have a power-to-weight ratio of approximately 7-9 lb per hp, including starter housing and air cleaner. Cylinders are opposed for smoother running and vibration-free operation even at low rpm. (OMC Engines & Equipment Div., Outboard Marine Corp.)

For more data circle No. 75 on postcard, p. 121

Foundry Aid

These cast-iron, bee-hive-shaped blocks fit onto the cross supports of any flame-cutting table. They hold steel plate clear of the table. This stops the flame from cutting and damaging the table bed. Because cast iron resists flame cutting, the blocks have long life. You can arrange them on the cutting-table supports according to the pattern of the desired cut. This takes only a few



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seconds. In addition, the blocks give a firmer, more-uniform working surface. Maintenance savings on flame-

cutting table beds have run up to 400 pct, as a result of their use. (Browne & Sharpe Mfg. Co.)

For more data circle No. 76 on postcard, p. 121

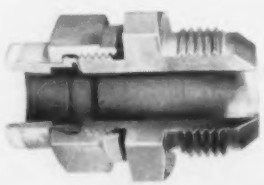
Alloy-Steel Bars

Two high-strength, alloy-steel bars offer new opportunities for improvements in parts design. They represent an extension of a line of steel bars made by a patented, high-temperature drawing process. In this process, the steel bar is drawn at pre-selected temperatures, significantly above room temperature, but below the lower critical temperature. Because of the individual processing of each bar and the inherent process characteristics, exceptional uniformity and control of properties is achieved. (LaSalle Steel Co., Booth 563)

For more data circle No. 77 on postcard, p. 121

Rigid Tube Coupling

High-temperature, high-pressure tube coupling has a superior seal. It maintains this seal under conditions



of shock, vibration, pressure overloads, pulsing action or temperature changes. The tight fittings are reduced in size and weight. Still,

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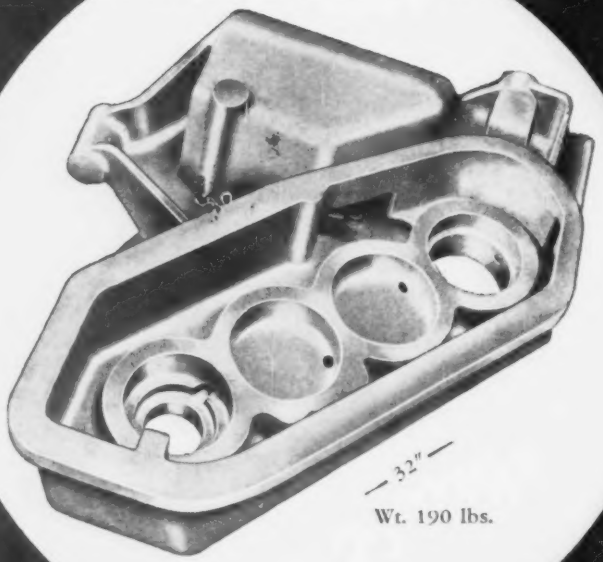
URICK'S URITE GRAY IRON



Wt. 190 lbs.

GEARED TO THE JOB

URICK Foundry's integrated sales and engineering departments are geared directly to the production department —all working together to supply high quality gray iron castings with dimensional stability, uniform density, and high machinability.

From the planning stage, all the way to the finished part, URITE gray iron castings are designed and engineered to deliver greater tensile strength in relation to the service required, and in many cases with less weight. URITE gray iron is better because it is cast with fine flake graphite uniformly distributed throughout the iron matrix.

URICK'S modern facilities, manned by a competent co-operative team, produces quantities of high grade castings to meet the most demanding schedules.

Contact URICK, the foundry that starts with "U" and stays with you. Write for advanced technical data about URITE gray iron castings.

URITE CASTINGS URICK FOUNDRY

DEPT. A2, ERIE, PENNSYLVANIA

there are no torqueing difficulties. They maintain the seal over extremely-wide, minimum and maximum tightening torques. The units also remain leakproof under cryogenic conditions. Testing to date also indicates the seal is capable of handling 5000-psi helium. (Resistoflex Corp.)

For more data circle No. 78 on postcard, p. 121

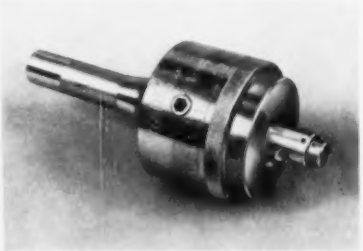
Power Transmission

Newest design refinements and application developments in a line of power-transmission devices will be featured at the show. One product in the line is a sprag-type clutch of special design. It suits many over-running, backstopping and indexing applications. Another is a 2-directional, torque-locking and positioning device. It operates both clockwise and counter-clockwise. First introduced to industry in 1960, it is particularly useful in the missile and aircraft fields. A third show feature is an all-metal centrifugal clutch. (Formsprag Co., Booth 736)

For more data circle No. 79 on postcard, p. 121

Tooling System

This new tooling system boasts extreme accuracy. Furthermore, the guaranteed repetitive accuracy in millionths is unimpaired by wear. Designed and developed after ex-



tensive research, the system suits precision boring machines, jig borers, and any other machine where quick changing of tools for high-precision, multiple operations is desirable or necessary. (Wadell Equipment Co.)

For more data circle No. 80 on postcard, p. 121

Who Buys Roebling Upholstery Spring Wire After You Do?

The end-user can hardly be expected to know a great deal about Roebling Springkote* Wire, helical spring wire, border and brace wire, zigzag and no-sag wire, wire for automatic machines, lacing wire . . .

Thus, the qualities of uniformity, temper, tensile strength, size and finish that are yours whenever you use Roebling Spring Wire mean long life, resiliency under constant use (and abuse) where it counts the most . . . to those who buy Roebling Upholstery Spring after you do.

When *you* buy it, you have the advantage of getting these qualities in *large coils*—up to 3000 pounds for uninterrupted production. For further details, write Roebling's Wire & Cold Rolled Steel Products Division, Trenton 2, New Jersey. *Reg. applied for

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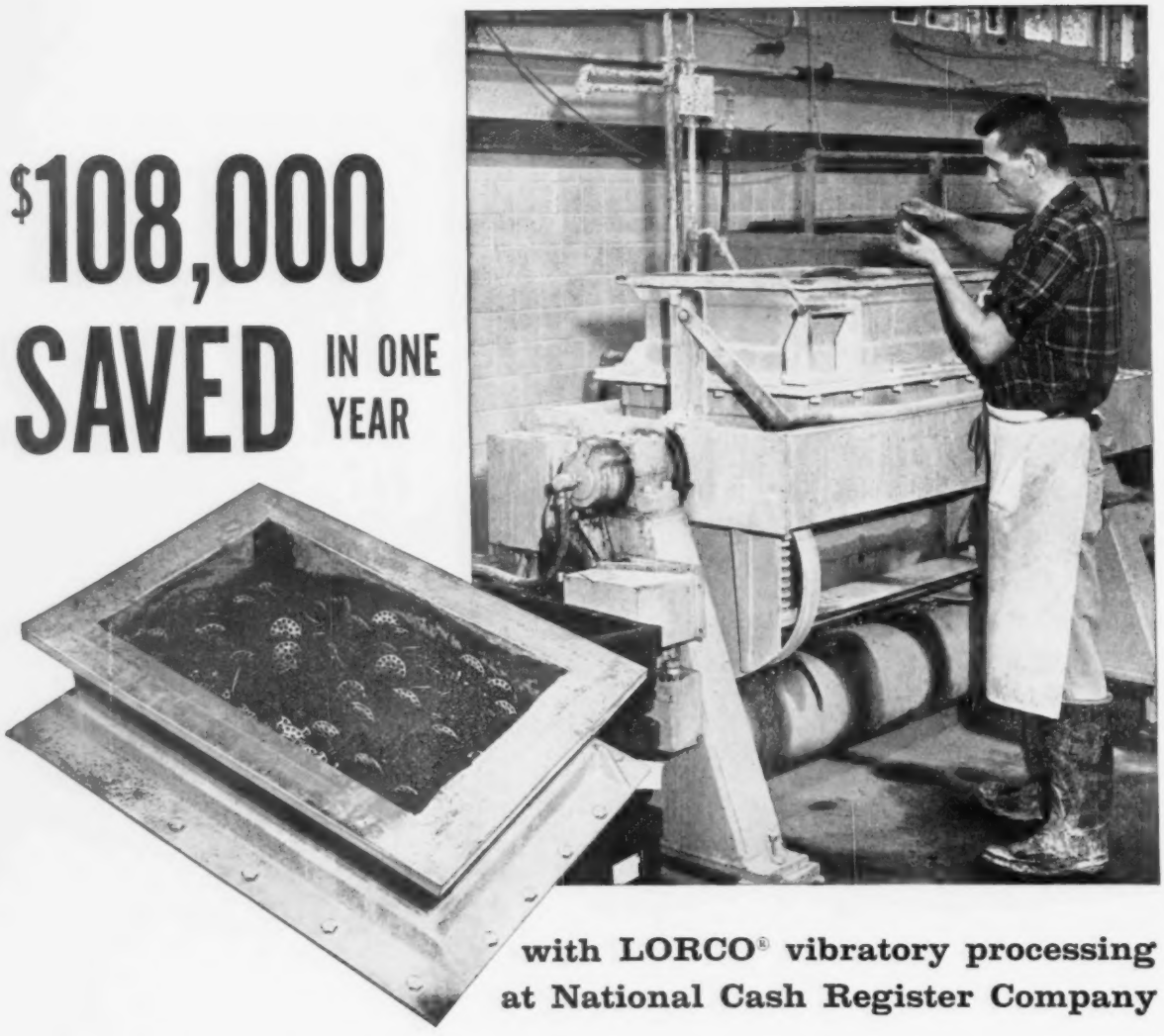
$108,000 SAVED IN ONE YEAR



with LORCO® vibratory processing at National Cash Register Company

It takes a heap of gears, pinions, levers, bearings, ratchets, contacts and other small parts to make a cash register, accounting machine or any of the other items of equipment manufactured at the National Cash Register Co. plant in Dayton, Ohio.

And it takes a heap of processing to deburr, radius, finish and otherwise prepare these parts for assembly into the finished product.

Even with Lorco vibratory finishing equipment 5 vibrators operate 24 hours a day to handle the 414 different parts now processed in Lorco equipment and to run tests on hundreds of other parts that are candidates for vibratory finishing.

But, compared to conventional barrel finishing and manual methods such as filing, grinding and brushing, Lorco vibratory finishing has effected a heap of savings—$108,000 in one year on 375 parts.

The other 39 parts which are processed in the vibrators receive the processing as an additional step to improve performance of the end product.

And this is an important part of the Lorco story—vibratory finishing gives you the finish you need. Thorough deburring, precise micro-inch finishing, accurate radiusing, close tolerances—all these you get with Lorco vibratory finishing, plus savings in time and in money.

Call on your Lorco engineer for the practical solution to finishing your "problem" parts. Or write today for details of Lorco experimental finishing service and media and compounds for precision barrel and vibratory finishing.

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Design Experts Meet

■ Members and guests of the American Society of Mechanical Engineers will gather at Detroit's Cobo Hall, May 22-25, for their annual Design Engineering Conference. Also featured at Cobo Hall is the concurrent Design Engineering Show where thousands of new design items will be on display.

Here's the complete schedule:

Conference hours — Monday, 10:00 am to noon; Tuesday through Thursday, 9:30 am to noon.

Show hours—Monday, Wednesday and Thursday, noon to 5:30 pm; Tuesday, noon to 10:00 pm.

ASME TECHNICAL PROGRAM

Monday, May 22

Panel Discussion

"How a Car is Planned and Engineered with Marketing, Purchasing, Manufacturing and Quality Control Considerations."

"Designing for Function and Cost Objectives."

"Production Engineering as it Affects Car Design and Sales."

"Role of the Supplier in Meeting Competition."

Tuesday, May 23

Manufacturing—Key To Saving

"Producibility—Designing for Production."

"Material Standardization to Reduce Costs."

Automatic Equipment—Speeds Production

"Special Requirements of Hydraulic Circuits for Servo-Controlled Machinery."

"Drives for Tape-Controlled Machine Tools."

Glass And Ceramics—Offer New Design Possibilities

"Ceramic Materials: A chemical and Structural Description."

"What Do Glasses and Ceramics Offer the Design Engineer."

High Strength Steel—Impact Of Recent Development

"High Strength Steels—Part I, Materials."

"High Strength Steels—Part II, Design and Fabrication."

Wednesday, May 24

Motors—Economics And Applications

"Electric Motors at Higher Temperature for Industrial Usage."

"Mechanical Application of Non-Excited Synchronous Motors."

Production—Cost Saving Hints

"Design Considerations and Drafting Techniques for Production on Numerically Controlled Production Machines."

"Cost and Value of Small Tolerances and Smooth Finishes."

Adhesives—For Metal Bonding

"Elastomeric Adhesives—Industry's New Tool."

"Factors in Joint Design Using Adhesives for Metal Bonding."

Cost Analysis—Fasteners and Powder Parts

"Which Fastener Should We Choose?"

"Designing With Powder Metallurgy to Improve Quality and Reduce Cost."

Thursday, May 25

Plastics—Unusual Behavior

"Filament Wound Pressure Vessels."

"An Introduction to Designing with Plastics."

Dynamics—Damping And Gears

"Visco-Elastic Damping."

"Effect of Misalignment on Tooth Action of Bevel and Hypoid Gears."

Lubrication—Molydisulfides As An Answer

"Molybdenum Disulfides a Lubricant"

"Molybdenum Disulfide as an Additive to Improve the Performance of an Automotive Multipurpose Grease."

product development does NOT start at the drawing board...

In-plant research and development programs tend to concentrate primarily on internal manufacturing improvements — and may not fully explore the fertile areas of product and market development. The creation of new products and markets for the construction industries requires a well-rounded organization of engineers, experienced in all phases of construction planning, design and field supervision.

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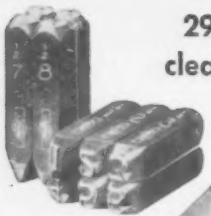

29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

Rounded corners for finger comfort

Rounded head distributes impact, reduces mushrooming.

Type size Identification

Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

Supreme Holders with "Roto-Pin" for quick, easy number change

An easy, half-turn flip for Roto-Pin releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Pin makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

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AFCO Fitting Co., Div. of The United States Air Compressor Co.	953
Acme Chain Corp.	1004
Acme Steel Co.	301
The Adams & Westlake Co.	201
Aeroquip Corp.	619
Aetna Ball and Roller Bearing Co.	213
Airmatic Valve, Inc.	1152
Air-Maze Corp.	160
The Louis Allis Co.	945
Alloy Casting Institute	329
Alloy Products Corp.	221
Aluminum Company of America	721
Aluminum Extrusions, Inc.	313
Amco Engineering Co.	449
American Machine & Metals, Inc.	857
American Nickeloid Co.	1042
American Optical Co.	1139
American Screw Co.	835
American Sealants Co.	131
American Smelting & Refining Co.	711
American Society of Mechanical Engineers	1210
American Stock Gear Div., Perfection Gear Co.	1212
American Zinc Institute	712
Amplex Div., Chrysler Corporation	1142
Anaconda Metal Hose Div., The American Brass Co.	312
The Anderson Co., Roton Products Div.	800
Arch Instrument Co., Inc.	1011
Arguto Oilless Bearing Co.	210
Armco Steel Corp.	409
Associated Spring Corp.	445
Atlas Chain & Mfg. Co.	505
The Auburn Mfg. Co.	540
Automatic Switch Co.	825
Automotive Rubber Company, Inc.	932
Avery Label Co., Div. of Avery Adhesive Products, Inc.	905
AviSun Corp.	419
B-Mold Div., Buckeye Brass & Mfg. Co.	1032
Barry Controls Inc.	904
Battelle Memorial Institute	236
Beaver Precision Products, Inc.	410
Bendix Computer Div. and Electric Boat Div., The Bendix Corp.	1147
Bendix Foundries, The Bendix Corp.	1149
The Beryllium Corp.	520
Binks Mfg. Co.	519
Boston Gear Works	342
W. H. Brady Co.	321
Buchanan Electrical Products Corp.	720
The Bristol Co.	1036
Brook Motor Corp.	1121
Browning Mfg. Co.	251
The Brush Beryllium Co.	657
Burling Instrument Co., Inc.	124
Cadillac Plastic Co.	207
Canada, The Department of Trade and Commerce	145
Carr Fastener Co. Div., United-Carr Fastener Corp.	1242
Carter Controls, Inc.	1005
Casting Engineers Div., Consolidated Foundries and Mfg. Corp.	460
Celanese Plastics Co., division of Celanese Corporation of America	645
Century Electric Co.	921
Chain Belt Co.	929
Chart-Pak Inc.	458
Chemiquip Co.	1200
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1...statically cast bends and reducers

2...centrifugally cast tubes

3...machining

4...welding

This is indicative of the high alloy casting work we turn out at Scottdale. We can produce static castings up to 6 tons and centrifugal castings up to 24 inches in diameter (OD) and up to 15 feet in length (depending upon the diameter). We have excellent machining facilities and men skilled in the welding of the chrome-nickel alloys.

Our metallurgists will be glad to recommend the proper alloy for the casting you need to combat corrosion, high temperature or abrasion or any combination of these three.

The DURALOY Company

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CHICAGO OFFICE: 332 South Michigan Avenue

DETROIT OFFICE: 23908 Woodward Avenue, Pleasant Ridge, Mich.

SHOW EXHIBITORS

Exhibitor	Booth
Circle F Mfg. Co.	422
Clad-Rex Div., Simoniz Co.	309
Cleveland Graphite Bronze Div., Clevite Corp.	121
Cleveland Machine Controls Corp.	336
Climax Molybdenum Co., Div. of American Metal Climax Co.	511
Clippard Instrument Laboratory, Inc.	1013
Coating Products Inc.	938
Cobehn, Inc.	102
Colonial Rubber Co.	919
Columbus Coated Fabrics Corp.	525
Columbus Electric Mfg. Co.	1055
Combination Pump Valve Co.	805
Commercial Filters Corp.	214
Congress Drives Div., Tann Corp.	924
Conneaut Rubber & Plastics Co.	919
Continental-Diamond Fibre Corp.	156
Controlex Corp. of America	122
Coors Porcelain Co.	1262
Copper & Brass Research Assoc.	528
Corbin Cabinet Lock Div., The American Hardware Corp.	1223
Crane Packing Co.	237
Crawford Fitting Co.	1108
Cullman Wheel Co.	1144
Curtiss-Wright Corp., Marquette Div.	1219
Cycledynamics, Inc.	1206
The D. S. D. Mfg. Co.	222
Dayton Industrial Products Co., Div. of Dayco Corp.	1017
The Decatur Casting Co.	955
De Laval Steam Turbine Co.	836
Deluxe Coils, Inc.	1116
Denison Engineering Div., American Brake Shoe Co.	615
Detroit Controls Div., American Radiator & Standard Sanitary Corp.	257
Diamond Chain Co., Inc.	1228
Disogrin Industries	1235
Dixon Corp.	146
Dixon Sintaloy Inc.	1059
The Dobeckmun Co., div. of The Dow Chemical Co.	745
Dodge Mfg. Corp.	322
Dow Corning Corp.	644
Drop Forge Assoc.	204
Duff-Norton Co.	401
E. I. du Pont de Nemours & Co., (Inc.), Elastomers Dept.	761
E. I. du Pont de Nemours & Co., (Inc.), Film Dept.	860
E. I. du Pont de Nemours & Co. (Inc.), Orchem Dept.	755
E. I. du Pont de Nemours & Co. (Inc.), Polychem Dept.	743
Durakool, Inc.	442
Duriron Company, Inc., Modern Industrial Plastics Div.	1236
Dynamic Gear Co., Inc.	134
Dzus Fastener Co., Inc.	428
ETC Inc.	1157
Eagle Signal Corp.	1014
Eastman Chemical Products, Inc., Chemicals Div.	719
Eastman Chemical Products, Inc., Plastics Div.	812
Eaton Mfg. Co.	656
Ebert Electronics Corp.	1119
Eclipse Machine Div., The Bendix Corp.	1147
Elastic Stop Nut Corp. of America	720
Electric Boat Div., General Dynamics Corp.	709
Electro Dynamic Div., General Dynamics Corp.	709
Electro-Flex Heat, Inc.	112
Electro-Mechanical Instrument Co.	1148
Electro-Technology	320
Enfab, Inc.	232

Enjay Chemical Co., div. of Humble Oil & Refining Co. 600
Eriez Mfg. Co. 245

FAC Div., Overseas Commodex Corp. 412
Falstrom Co. 821
Fasson Products, div. of Avery Adhesive Products, Inc. 416
Faultless Caster Corp. 1036
Fawick Airflex Div., Fawick Corp. 224
Fenwal Inc. 450
Ferry Cap & Set Screw Co. 809
Fiberfil, Inc. 1101
Flexible Controls Corp. 1140
The Flodar Corp. 311
Florida Development Commission 1150
Foote Bros. Gear and Machine Corp. 444
Formsprag Co. 736
Franklin Electric Co., Inc. 1052
H. B. Fuller Co. 1129

Garlock Inc. 618
General Bearing Co., Inc. 1132
General Controls Co. 1024
General Electric Co. 423
The General Fireproofing Co. 942
General Motors Corp., Research Laboratories 704
General Time Corp., Haydon Div. 853
Glass Laboratories, Inc. 148
Gleason Reel Corp. 1015
Gleason Works 500
B. F. Goodrich Aviation Products, division of B. F. Goodrich Co. 420
Gray Iron Founders' Society, Inc. 305
Greene, Tweed & Co. 105
Gries Reproducer Corp. 1143
Groov-Pin Corp. 1221

H P L Jersey Co. 911
H P L Mfg. Co. 911
Hamilton Foundry Inc. 744
Hamilton Mfg. Co. 620
Handy & Harman 516
The Hansen Mfg. Co. 512
Hart Reduction Pulley Co. 109
Hartford Steel Ball Co. 1205
The Hartwell Corp. 915
John Hassall, Inc. 927
Haynes Stellite Co., div. of Union Carbide Corp. 621
The Heim Co. 843
Heinemann Electric Co. 1247
Heli-Coil Corp. 1043
Hexcel Products Inc. 1053
Heyman Mfg. Co. 218
The Hilliard Corp. 1120
Hitchiner Mfg. Co., Inc. 1025
Hoke Inc. 455
Hoover Ball and Bearing Co. 1062
E. F. Houghton & Co. 920
Humphrey Products Div., General Gas Light Co. 1154
Hungerford Plastics Corp. 610
Hunter Spring Co., div. of American Machine & Metals, Inc. 857
Hydraulics & Pneumatics 1040

Illinois Tool Works 844
Imperial-Eastman Corp. 956
Industrial Tectonics, Inc. 1000
Instrument Specialties Co., Inc. 343
The International Nickel Co., Inc. 529
International Packings Corp. 742

Janney Cylinder Co. 1163
Johnson Bronze Co. 1012
Jones & Laughlin Steel Corp., Stainless and Strip Div. 737
The Joyce-Cridland Co. 1110

The Kaydon Engineering Corp. 137
Kaynar Mfg. Co. 1010
Kennametal Inc. 562
Kobe Inc. 123

Laminated Shim Company, Inc. 116
The Lamson & Sessions Co. 140

BIGGEST NEWS in wire rope in years!

Macwhyte's new 7-FLEX is sure to change your thinking about wire rope!

There's absolutely no other wire rope like 7-FLEX! It's an *all-purpose* rope, as flexible as 8-strand — as rugged as 6 x 19 — as fatigue-resistant as 6 x 37.

7-FLEX has 16⅔% more wearing surface than 6-strand rope. There is less unit pressure between rope and sheaves, so less rope and sheave wear. There is more sheave contact, less rope-creep. Result: longer rope life, less downtime, lower operating costs!

You owe it to your company to learn more about 7-FLEX. Ask any Macwhyte distributor. Free bulletin 60100-R on request.

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Corrosion-Resisting Wire Rope — Many sizes and constructions in Stainless Steel, Monel Metal and plastic or nylon coated. Meet the requirements imposed by alkaline and acid conditions and marine atmospheres, temperatures, and humidity. Send for Bulletin 49-30.

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Wire Rope Assemblies — Safe-Lock wire rope assemblies are precision made to your order in the size, length, and strength needed. Uniform high quality with fittings permanently swaged to the rope. Many standard designs. Send for Catalog 6101.

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2900 FOURTEENTH AVENUE, KENOSHA, WIS.
Wire Rope Manufacturing Specialists Since 1896
343

We've extended our service to you. We're now stocking LUKENS stainless-clad steel* for 24-hour shipment at mill prices on warehouse quantities

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*Lukens stainless-clad steel is a solid plate—not a lining—composed of a layer of stainless permanently bonded over its entire surface to an economical backing steel. Stainless-clad steel offers the corrosion resistance of solid stainless at considerably lower price. Write for our price list.

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SHOW EXHIBITORS

Exhibitor	Booth
Lancaster Glass Corp.	304
Landis & Gyr, Inc.	1160
LaSalle Steel Co.	563
Lead Industries Assoc.	111
Leiman Bros., Inc.	129
Licon Div., Illinois Tool Works	844
Lignum-Vitae Products Corp.	144
Linemaster Switch Corp.	1145
Link-Belt Co.	743
Lisle Corp.	1224
Lord Mfg. Co.	912
Lovejoy Flexible Coupling Co.	1044
MacLean-Fogg Lock Nut Co.	242
Magnesium Products of Milwaukee, Inc.	1015
The Malayan Tin Bureau	1047
Malleable Castings Council	700
Manheim Mfg. & Belting Co.	1241
Marbon Chemical Div., Borg-Warner Corp.	725
Marlane Development Co., Inc.	306
Martin Engineering Co.	138
The Masland Duraleather Co.	944
Maurey Mfg. Corp.	346
Mayline Co., Inc.	732
Maysteel Products, Inc.	1015
McGill Mfg. Co.	1031
McLouth Steel Corp.	810
Mead Specialties Co.	839
Melray Mfg. Co.	911
Metal Powder Industries Federation	826
Metal & Thermit Corp.	1125, 1049
Metals & Controls Inc., Div. of Texas Instruments, General Plate Products	1201
Miller Electric Co.	300
Minnesota Mining and Mfg. Co.	550
Minneapolis-Honeywell Regulator Co., Micro Switch Div.	1211
Mo-Bar Hydraulic Sales Co.	829
Moeller Mfg. Co., Inc.	1257
Mono-Race Div., The Thew Shovel Co.	543
Morse Chain Co., a Borg-Warner Industry	842
Mueller Brass Co.	701
Mycalex Corp. of America	1063
National Beryllia Corp.	1134
National Carbon Co., Division of Union Carbide Corp.	621
National Lead Co.	545
National Pneumatic Co., Inc., Janette Div.	101
National Standard Co.	801
National Tube Div., United States Steel	632
National Vulcanized Fibre Co.	421
New Departure Div., General Motors Corp.	118
New Hermes Engraving Machine Corp.	130
Nice Ball Bearing Co.	1060
C. A. Norgren Co.	910
Nuclear Products Company	209
The Nylok Corp.	440
Nylon Molded Products Corp.	125
The Ohio Gear Co.	1136
The Ohio Knife Co.	231
The Ohio Rubber Co., div. of The Eagle-Picher Co.	610
Ohio Seamless Tube Div., Copperweld Steel Co.	811
Olin Mathieson Chemical Corp., Metals Div.	601
OPW-Jordan Corp.	1202
Orange Roller Bearing Co., Inc.	1020
O'Sullivan Rubber Corp.	359
Owatonna Tool Co.	1203
Owens-Corning Fiberglas Corp.	462
Ozalid, div. of General Aniline & Film Corp.	200
P. I. C. Design Corp., a subsidiary of Benrus Watch Co.	340
Pack Mfg. Co.	1238
Paktron Div., Illinois Tool Works	844
Pall Corp.	960
The Palnut Co., div. of United-Carr Fastener Corp.	115
Panduit Corp.	1217
Paramount Textile Machinery Co.	1254
Park Nameplate Co., Inc.	947
Parker-Hannifin Corp.	544
Parker-Kalon Div., General American Transportation Corp.	451
Penn Engineering & Mfg. Corp.	1213
Pennsylvania Fluorocarbon Co., Inc.	357
Permacel	212
Plan Hold Corp.	1131
Poloron Products, Inc.	716
Poxylube, Inc.	1138
Polygon Plastic Co.	1251
The Polymer Corp.	1105
H. K. Porter Co., Inc., Riverside-Alloy Metal Div.	626
Potter & Brumfield, div. of American Machine & Foundry Co.	1162
Power Transmission Design	1253
Precision Metal Molding	1253
Presswork Inc.	1208
Product Design & Development	710
Product Engineering	263
Prudential Industries, Inc.	505
Ramsey Corp.	1215
Randall Graphite Bearings, Inc.	1016
Raybestos-Manhattan, Inc.	918
Reed & Prince Co.	1220
Revere Copper and Brass Inc.	521
Reynolds Metals Co.	215
M. H. Rhodes, Inc.	162
Riehle Testing Machines Div., American Machine & Metals, Inc.	857
Rigidized Metals Corp.	1045
Robbins & Myers, Inc.	356
Robertshaw-Fulton Controls Co., Acro Div. and Bridgeport Thermostat Div.	223
Robertshaw-Fulton Controls Co., Fulton Sylphon Div.	223
Robin Products Co.	103
Roehlen Engraving Works	536
Rohm & Haas Co.	463
Roller Bearing Co. of America	362
Rollway Bearing Co., Inc.	117
Roper Hydraulics, Inc.	119
Rosan Inc.	337
Rotherm Engineering Company, Inc.	104
Russell, Burdsall & Ward Bolt and Nut Co.	937
Saginaw Steering Gear Div., General Motors Corp.	845
Sandusky Foundry & Machine Co.	405
Scott Paper Co., Industrial Marketing Div.	1112
Screen Products, Inc.	1147
Scully-Jones and Co.	205
Sealol Inc., Warwick Industrial Park	1058
Selectrons, Ltd.	306
Shakeproof Div., Illinois Tool Works	844
Shwayder Bros., Inc.	1057
Sier-Bath Gear & Pump Co., Inc.	958
Sigma Instruments, Inc.	211
Sigmamotor Inc.	1233
Simmons Fastener Corp.	957
Simplatrol Products Corp.	1161
Skinner Electric Valve Div., The Skinner Chuck Co.	900
Snap-Tite, Inc.	1029
The Snow Nabstedt Gear Corp.	1039
Southco Div., South Chester Corp.	1021
Space Missile Materials Corp.	1256
Spaulding Fibre Company, Inc.	939
Spiroid Div., Illinois Tool Works	844
Stacor Equipment Co.	418
Stahlin Bros. Fibre Works, Inc.	1061
Standard Pressed Steel Co.	815
Star Expansion Industries Corp.	331

AUTOMATIC, PRECISION DRILLING

EVERY TIME

. . . new Gardner-Denver "Tru-Feed"® drills

Rugged, air-powered Gardner-Denver "Tru-Feed" drilling units drill holes up to 1½" in diameter even in hardest metals. Positive mechanical feed assures clean, accurate holes. Precise control of entire operating cycle, and full-power operation at any speed, give smooth, fast performance. Drill's adjustable, rapid advance and sensitive thrust-control features are big cost-savers in production drilling. Available in either portable or stationary models.

Automatic operation—Just push a button to start cycle. When hole is drilled, tool retracts and automatically shuts off.

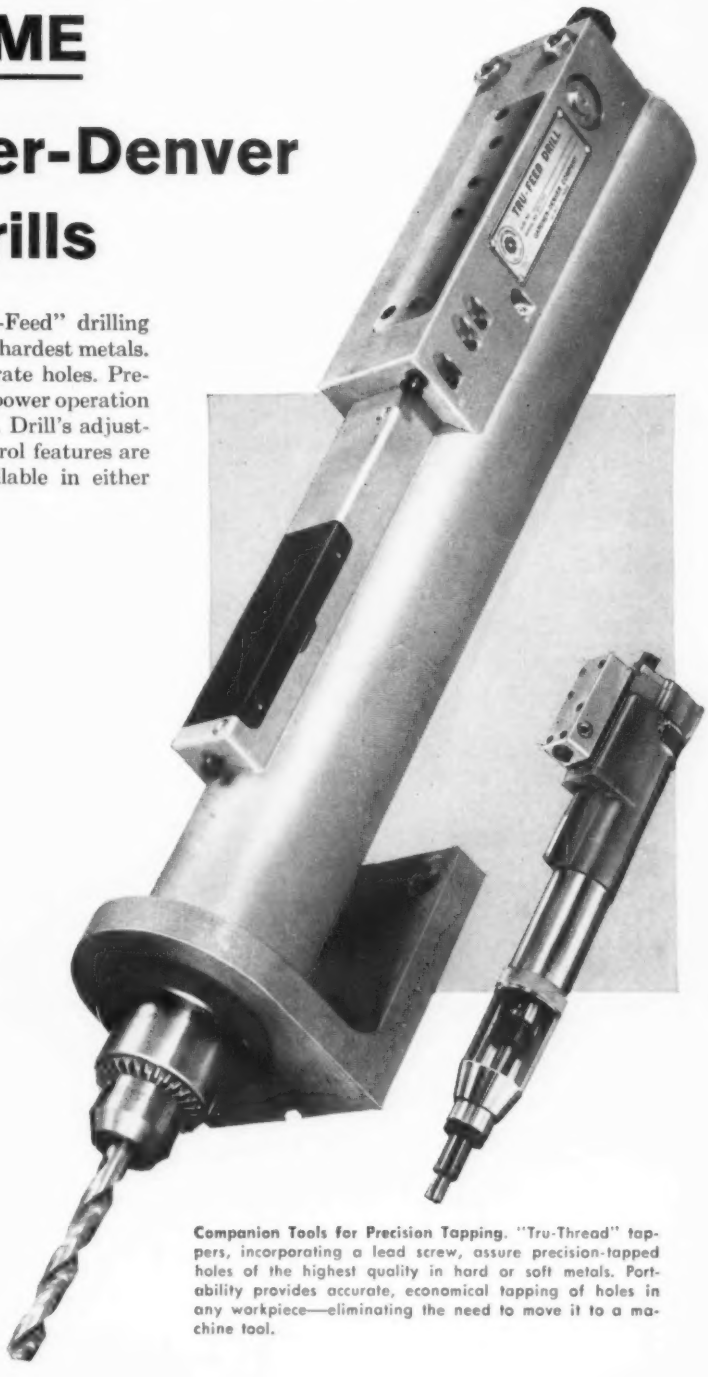
Adjustable stroke—Set two stops to utilize any portion of stroke. Front stop controls hole depth to within .005".

Portable or stationary—For stationary applications, use mounting brackets or drill bushing tips. In portable use, a simple drill bushing fixture lets you move drill from hole to hole. "Tru-Thread"® tapper used in same tooling maintains concentricity between drilled hole and tap.

Adaptable to Automation—Start and stop poppets may be replaced with adapters for remote operation. Pressure-type poppets may be used. A pressure signal is built-in to control sequence of indexing and clamping fixtures.

Powerful and versatile—Compact, heavy-duty air motors develop up to 1½ hp.—provide dependable power for hard-metal drilling, gun-drilling, reaming, boring, counterboring, countersinking and other production operations at speeds from 75 to 4400 rpm, and feeds from .0005" to .0145" per revolution.

For details, request bulletins 93 and 96 on Gardner-Denver automatic drilling and tapping equipment.



Companion Tools for Precision Tapping. "Tru-Thread" tappers, incorporating a lead screw, assure precision-tapped holes of the highest quality in hard or soft metals. Portability provides accurate, economical tapping of holes in any workpiece—eliminating the need to move it to a machine tool.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

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ATLAS

60-Ton Diesel-Electric Coal Transfer

FOR ENDURING PERFORMANCE

Atlas Transfer Cars are designed to meet individual production needs of each user, and built with workmanship that assures the ruggedness so necessary for safe, dependable service.

Since 1896 . . . Engineers-Builders of Ore Transfers . . . Scale Cars . . . Coke Quenchers . . . Coal Larries . . . Door Machines . . . Safety-Type Transfers . . . Storage Battery Locomotives

ATLAS CAR & MFG. COMPANY

1140 IVANHOE ROAD

CLEVELAND 10, OHIO

SHOW EXHIBITORS

Exhibitor	Booth
Sterling Precision Corp.	1001
Edwin B. Stimpson Company, Inc.	1100
Stokes Molded Products Div., The Electric Storage Battery Co.	319
Stow Mfg. Co.	150
Stratoflex Inc.	106
Superior Tube Co.	849
Sweet's Catalog Service, Div. of F. W. Dodge Corp.	663
Sylvania Electric Products Inc.	542
Synthane Corp.	143
Syntron Co.	743
Tann Corp., Congress Drives Div.	924
The Thomas & Betts Co., Inc.	228
Thomas Flexible Coupling Co.	943
Thomson Industries, Inc.	962
Arthur Tickle Engineering Works, Inc.	323
Tinnerman Products, Inc.	345
Tormag Products Div., Gleason Reel Corp.	1015
Toyad Corp.	344
Tubular Rivet and Stud Co.	350
The Ucinite Co., div. of United-Carr Fastener Corp.	1240
Union Carbide Corp.	621
Unitech Corp.	1127
United Shoe Machinery Corp.	400
U. S. Department of Commerce	609
U. S. Electrical Motors Inc.	508
U. S. Gauge Div., American Machine & Metals, Inc.	857
United States Plywood Corp.	126
United States Rubber Co., Mechanical Goods Div.	762
United States Steel	632
U. S. Stoneware Co.	919
Universal Castings Corp.	325
Universal Drafting Machine Corp.	432
Valcor Engineering Corp.	1243
Vanton Pump & Equipment Corp., div. of Cooper Alloy Corp.	127
Veeder-Root Inc.	243
Vickers Inc., Administrative & Engineering Center	549
Viking Pump Co.	1231
Waldes Kohinoor, Inc., Truarc Retaining Rings Div.	1018
Waldron-Hartig Div., Midland-Ross Corp.	1115
Wall Colmonoy Corp., Stainless Processing Div.	1234
Warner Automotive Div., Borg-Warner Corp.	501
Warner Electric Brake & Clutch Co.	1246
Washington Steel Corp.	856
Waukesha Foundry Co.	616
The Weatherhead Co., Fort Wayne Div.	1259
Web Controls Corp.	247
Weckesser Co.	100
Welding Design & Fabrication	1040
Westchester Plastics, Inc.	1028
Westline Products Div., Western Lithograph Co.	142
Westplex Corp.	1156
The S. S. White Dental Mfg. Co., Industrial Div.	916
Edwin L. Wiegand Co.	220
Wilkerson Corp.	107
Winsmith Inc.	1244
Wittek Mfg. Co.	526
Wolverine Tube, div. of Calumet & Hecla, Inc.	1111
T. B. Wood's Sons Co.	901
Wooster Div., Borg-Warner Corp.	501
Worthington Corp.	308
Zenith Electric Co.	1237
Zurn Industries, Inc.	1040

He's Watching a Band Sawing Miracle

This band saw operator at the Bell & Gossett Company plant in Morton Grove, Illinois, is watching "Controlled Accuracy". . . accuracy, being held to within a few thousandths of being perfectly straight, and he can actually *see* the band blade being guided in the saw cut to produce this accuracy! No further machining is required before the pipe is welded into an assembly for a Bell & Gossett Heat Exchanger Unit.

Band sawing accuracy like this is nothing short of miraculous—especially when it can be done on a high production basis, as Bell & Gossett is doing. And when the same tolerances can be held on cut-off pieces from 2" to 18" in diameter, this MARVEL #81 Band Saw Machine can be truly called a precision machine tool.

The secret of this amazing sawing accuracy is in the MARVEL "SURE-LINE" Automatic Accuracy Control—a simple and extremely effective electro-mechanical servo-mechanism that continuously senses and automatically corrects any tendency of a band blade to drift to either side of a desired line of cut. The "SURE-LINE" unit literally "steers" the blade to make a straight cut. This permits the use of heavier feed pressures and, when desirable, higher blade speeds, to do the work faster, without sacrifice of accuracy. Incorporated in the new MARVEL #81 Series High Speed Heavy Duty Hydraulic Band Saws, the "SURE-LINE" permits full utilization of all the advantages of high speed steel band saw blades—while extending their usable blade life as much as 50%.

Before you buy any band saw machine, get complete details on MARVEL #81 Series Single Cut, or Automatic Shuttle Type Bar Feed Production Band Saws—the machines DESIGNED AND BUILT TO REDUCE SAWING COSTS. *Write for catalog today.*

ARMSTRONG-BLUM MANUFACTURING CO.
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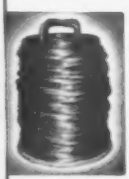
MARVEL *Metal Cutting* SAWS
Better Machines—Better Blades

...*in special coatings for long lasting fine appearance*

MODERN WIRE PACKAGING FOR SPEEDING PRODUCTION

ECONO-COIL®



The single length catch-weight coil that reduces scrap loss and down time in wire fabrication. Continuous length 1500# to 2500#, depending on finish and gage, reduces coil changes, cuts waste.

LEVERPAK or PAYOFFPAK

Modern drum containers protect wire against moisture, dirt; keep wire clean and safe. Handles 500# to 650# catch-weight single length coils, for sizes 14 ga. through 24 gauge. Other sizes on application.

One of these three special finishes may be just the thing to give your product added good looks and high quality appeal. Coppered: Extra smooth finish, for bucket bails, and many items like bag ties, card holders, baggage hooks. Tinned: Unusual brightness and luster, where appearance is important, as in lamp shade frames. Brytite®: Zinc coated wire with the plated look, takes hard turns and twists without flaking or powdering, for chains, display racks, bottle carriers, etc.

Smoothness of surface, lasting luster and uniform workability are hallmarks of Continental Wire, as proved in countless applications. Other finishes, in addition to those above are available, in various tempers and analyses, in low and medium low carbon steel. Your product's sales appeal may depend on Wire-Appeal! Write today for our wire manual.

fine finishes in manufacturers' wire

CONTINENTAL STEEL

CORPORATION — KOKOMO, INDIANA

PRODUCERS OF Manufacturers' Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, BRYTITE, Annealed, Liquor-Finished, Bright, and Special Shaped Wire. Also Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

May Recovery Picks Up Speed

The May pickup in steel demand shows every sign of exceeding the 10 pct gain forecast earlier.

The improvement base is widening and all products and industries are contributing to the gain.

■ The May pickup in steel demand continues to grow stronger. The 10 pct gain in evidence a few weeks ago seems assured. The question now is how much higher will it be?

Region by region, steel mills report orders are on the increase. While the gains are strongest in the midlands of the nation, they are general from coast to coast. And the recovery is considered basically solid; there is still little or no inventory accumulation.

Positive Signs — Most signs this week point to the following:

Steel demand is still going up.

Stocks of steel in users' hands are meager.

Auto ordering is a big factor.

Miscellaneous business is expanding.

Ordering in anticipation of auto labor trouble and vacation shutdowns is beginning to show up and will become increasingly important in the next few weeks.

General Improvement — Steel consumption, which had dropped below 60 pct (of the steel industry's rated capacity), has been moving up with shipments. By summer, consumption is expected to be at 70 pct —with steel production at nearly that level. In any event, between now and the end of June mill operations should pick up enough to lift the operating rate to 65 pct for the second quarter.

Better-than-expected automotive orders are a big factor in the upturn. So is the continued strength in tinplate and galvanized. But the advance has not come just from one or two areas. The general base of steel demand is broader than a week ago and still spreading. All products and all industries show improvement.

Spot Shortages—Ford Motor Co. and General Motors Corp.'s Fisher Body Div. are asking mills how much more tonnage they can still get delivery on this month. This indicates schedule boosts in the auto industry may be creating spot shortages in inventories.

While there have been isolated cases of companies running short of steel, there is still no trend toward extended commitments. And there is still no scare buying.

Stretchout Coming—But the days of quick delivery are numbered. Tinplate and galvanized producers are finding it increasingly difficult to meet delivery promises. Sheet and strip mills are also feeling the pressure and delivery times will undoubtedly be extended within the next few weeks.

Construction Is Key—However, the real kicker that could set off the market is construction. It is the strongest factor on the West Coast (see p. 93), just about carrying mills in that area by itself.

But its contribution to the recovery over the rest of the country has been spotty. Structural mills around Chicago are operating at a pretty fair rate; elsewhere there is still no zip in sales.

But, with the big building season at hand, and with inventories low, construction could start taking a lot more steel.

District Steel Production Index 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	107	103	103	119
Buffalo	112	100	88	114
Pittsburgh	92	90	86	114
Youngstown	89	84	70	89
Cleveland	116	105	91	124
Detroit	117	113	106	142
Chicago	106	102	96	114
Cincinnati	113	103	87	119
St. Louis	111	113	112	112
Southern	101	94	102	116
Western	124	121	113	113
U. S. Index	104.3	99.7	93.8	114.7

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,943	1,858	28,987	45,877
Ingot Index				
(1957-59=100)	104.3	99.7	86.4	136.8
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$36.50	$36.50	$39.17	$33.17
No. 2 bundles	$24.17	$24.17	$27.17	$23.17

Problem: How Well PA's Do Job

A clear view of the roadblocks is needed before headway can be made in evaluating purchasing performance.

A member of a national committee tackling the problem highlights some blocks.

■ "I have more curiosity than knowledge on the subject of evaluation of purchasing performance."

This is the way Walter J. Brooking, purchasing director of Foote Mineral Co., approaches the subject. But he has personal experience with evaluation plans. And he has an insight into the workings of many other plans as a member of the National Assn. of Purchasing Agents Committee on Evaluating Purchasing Performance.

Mr. Brooking believes strongly that more widespread and better evaluation of the buying function must precede full professional development and recognition of purchasing.

One Block — "One of the first blocks," he says, "is lack of perspective on the subject."

He points out that performance evaluation can be done by the purchasing department head for his own group. Or it can be the evaluation of the company buying function by top management. Mr. Brooking believes that at present, the only practical approach is for purchasing heads to set up plans to evaluate their own department performances. Going beyond this is wandering into a no-man's land.

But he also sees the departmental approach as step one in any broader use of evaluation. "When I know my department is doing a sound job," he says, "then I have the means to report to management."

Plans Weak—Present efforts to set up formal evaluation plans on purchasing by management are not always rewarding. Along this line, Mr. Brooking cites evaluations based on the costs of operating purchasing departments versus the dollar volume of orders placed. Some companies use this ratio as a standard of efficiency of the purchasing department. A purchasing department that can process orders with high dollar value, but at a low operating cost, is an efficient one.

Mr. Brooking concedes this may be one useful standard for year-to-year comparisons. But it still cannot tell management if it has an efficient purchasing operation relative to competing companies. Also, it can be misleading even when used within a company.

Raw materials orders, while high in dollar value, may be easiest to issue. These orders have often been reduced to tight specifications and automatic routing to certain vendors. A vitally needed R&D item, on the other hand, can have small dollar value but require a high degree of knowledge of vendor capabilities on the part of the buyer.

PA's Sell — Mr. Brooking highlights another hurdle in the way of sound evaluation plans: "The best purchasing men are good salesmen," he says. "One of the best ways to judge a PA is to note how well he sells. For example, one PA is able to sell his management on a substitute material that results in great savings. Another has the knowledge and ideas but can't sell them. Result, no savings.

"And vendors need to be sold. A good selling PA can get vendors to go all out for his company."

BROOKING: "The best buyers are good salesmen . . ."

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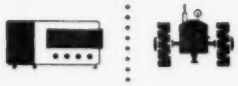

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Is Upturn Coming For Heavy Steel?

Strong sales of shapes and plates would do a lot to improve the market.

There are signs of strength in Midwest and Farwest. But elsewhere mills still wait for an order upsurge.

■ Heavy steel products, including plates and shapes, appear poised for an upturn.

In some areas, notably the West Coast, structurals and other building steels are leading a market advance. (See story p. 93.) Midwest structural mills are producing at a fairly good rate. The seasonal impact of construction should strengthen the heavy steel market.

But the key question is this: How much will construction aid steel sales? On a nationwide basis, the effect is not impressive, so far.

Rundown by Areas—Here's how the heavy steel market looks by areas:

Along the East Coast, demand for structurals has improved a little. But this hasn't boosted mill activity much. One structural sales official, admitting his mill is operating at reduced rates says, "We're doing fine—at this limited level of business."

Both shapes and plates are still available in a couple of weeks or sooner at East Coast mills. At Pittsburgh, producers of heavy steel products are still waiting for the recovery. May orders are shaping up a little better than April's. But in terms of tonnage even this is disappointing.

Better in the West—In the Midwest, however, some structural mills are operating about 18 turns a week. Order volume is rising. Material from out-of-the-area mills has kept deliveries rapid. But the market shows signs of tightening up. Chicago mills say plate is still not making any great gains.

Along the West Coast, second quarter shipments of shapes, plates, bars, and sheets indicate a 25 pct gain over the last quarter of 1960. They will also probably be about 16 pct over shipments in first quarter '61.

Sheet and Strip—With orders improving, some market areas expect longer delivery times soon. But the picture is uneven. Most of the gains on a basis of geography are in the **Midwest.** By products the strongest gains are being made by galvanized sheet and tinplate.

East Coast mills say sheet orders from auto parts suppliers are tapering off. Non-automotive sheet accounts are still holding down on buying.

A **Pittsburgh** mill reports May orders for cold-rolled sheet are slightly better than April's. This has extended deliveries about a week. But other mills there believe July and August demand for sheet is the big question mark.

In the **Midwest,** mill activity on both hot-rolled and cold-rolled sheet is moving up. These products are still going out on rush orders. But it's getting harder and harder for the mills to make delivery concessions. Lead times are expected to stretch out on both sheet and strip during the next two weeks.

In **Detroit,** mills say June will be the last big production month for 1961 model cars. May bookings are strong. First steel orders for the 1962 model cars are expected the latter part of June.

Tinplate mills at **Pittsburgh** predict strong demand through June. It's expected that third quarter shipments will be a little smaller than those of the second quarter.

Galvanized Sheet—This product continues in strong demand. At least one **East Coast** mill is booked through the second quarter. **Pittsburgh** producers are solidly booked four weeks out. Orders keep mounting, month after month. At **Chicago,** the startup of two new galvanizing lines has not cut down demand. Some mills are into July on shipments.

Bar—Gradual improvement continues with the emphasis on cold-finished bar. In the **Midwest,** cold-finished users are booking orders as far as two months ahead. Warehouses are among those who are stepping up buying. As a result, producers there expect May output to improve by 15 pct. Hot-rolled bars, however, are not showing as much movement.

Pittsburgh mills report auto accounts came in for some extra bar tonnage in May. There is talk deliveries may lengthen, but this hasn't happened yet. Users are delaying as long as possible before placing orders.

Service Centers—In a move that could be important, warehouses are starting to beef up their inventories. The activity is centered in the **Midwest** and is concentrated mainly in cold-drawn bars and structurals. Warehouses in other areas are closely checking mill shipping schedules. They apparently don't want to be caught short if deliveries lengthen out.

PURCHASING AGENT'S CHECKLIST

Will new stainless steel muffler start commodity pricing in steel industry? P. 75

Prospects for steadier tin price are promising. P. 80

How to plan production runs with precision in mind. F. 105

COMPARISON OF PRICES

(Effective May 8, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	May 8 1961	May 1 1961	Apr. 10 1961	May 10 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	May 8 1961	May 1 1961	Apr. 10 1961	May 10 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn. cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$34.50	$36.50	$34.50
No. 1 steel, Phila. area	39.50	39.50	42.50	34.50
No. 1 steel, Chicago	35.50	35.50	38.50	30.50
No. 1 bundles, Detroit	33.50	33.50	34.50	29.50
Low phos. Youngstown	37.50	37.50	39.50	36.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	50.50
No. 1 mach'y cast, Phila.	49.50	49.50	50.50	51.50
No. 1 mach'y cast, Chicago	47.50	47.50	50.50	51.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$36.50	$36.50	$39.17	$33.17
No. 2 bundles	24.17	24.17	27.17	23.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$29.00	$29.00	$29.00	$33.00
Copper, Lake, Conn.	29.00	29.00	29.00	33.00
Tin, Straits, N. Y.	109.75†	107.625**	100.50	99.00
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Finished Steel Composite

Weighted index on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on everages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 177
Comparison of Prices 181
Bars 188
Billets, Blooms and Slabs 186
*Boiler Tubes
*Clad Steel
Coke 191
*Electrical Sheets
*Electrodes
*Electroplating Supplies
Fasteners 190
Ferroalloys 192
Iron Ore 190
Merchant Wire Products 190
*Metal Powders
Nonferrous
Mill Products 185
Primary Prices 181, 184, 185
Remelted Metals 185
Scrap 185
Piling 186
Pig Iron 190
Pipe and Tubing 191
Plates 188
*Rails
*Refractories
Service Center Prices 189
Shapes 186
Sheets 187
*Spring Steel
Stainless 190
Steel Scrap 183
Strip 186
Structurals 186
Tinplate 187
Tool Steel 190
*Track Supplies
Water Pipe Index 191
Wire 188
Wire Rod 187

*Appears in the May 4-May 18 issues.

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Confusion Clouds Market Picture

The scrap market is in a confused state this week. Some areas say prices are firming and may climb.

Other areas report continued weakness and the chance of further drops.

■ The scrap market entered a thoroughly confused state this week. In some areas, definite signs of firmness are present and prices could rise. Other areas report falling levels.

The key seems to be in the steel picture. Many scrap dealers are resisting lower prices in anticipation of continued gains by steel producers. If steel output continues to rise, scrap prices may again climb. If not, further drops are likely.

Detroit, for example, reports a slight downward drift is in the making this week. But Chicago and Cleveland markets firmed. Philadelphia prices held steady after some mills offered to buy at lower levels. And the Pittsburgh market lull continues as scrapmen await a major buy to see which way the price pattern will go.

On the basis of this confused picture, The IRON AGE composite price for No. 1 heavy melting remains unchanged at $36.50. The composite price for No. 2 bundles is still $24.17.

Pittsburgh — The market lull continues. There are some signs that prices may be leveling off. One mill is meeting resistance on a price of $25 for No. 2 bundles. Dealers are encouraged by reports of improved steel operations. However, there is not enough activity to provide a firm basis for a quotation. A price of $35 to the dealer for No. 1 heavy melting has reportedly produced enough scrap to meet the requirements of one consumer. A part of the local automotive tonnage has been sold for less than $41. Railroad scrap attracts little interest. Brokers are waiting cautiously for a major buy to start a decisive price movement.

Chicago—An unexpected firming became apparent in this market as a new factory bundle list moved at higher prices. Also, two mills purchased material in the steelmaking grades at prices slightly above last week. No real gains had been expected until July, but there is some talk of minor increases in June. Volume continues low. At least one case of an advance in broker buying prices is reported. This seems to stem from fear that exporters may jump in to corner the market prior to the historic July price gains.

Philadelphia—One mill in this area bought a limited amount of No. 2 heavy melting at a lower price. But the tonnage was so small, it is not representative of this market. Export prices are firming again. Activity is still slow domestically.

New York — Most dealers are keeping busy filling old orders. However, some say the present market is dull and easy. But new orders continue to come in slowly. Dealers are apprehensive.

Detroit—Brokers are doing some buying, but not in volume. Dealers are filling orders made three weeks ago. The typical mid-month quiet has set in. Exporters are out of the market—at least for now. Canada made some small buys and there is a chance it will come into the market again this month. Overall, activity appears thin and quiet with currents of a slight downward drift in the making.

Cleveland — The market has taken on a firmer tone based mostly on hope of a better market because of increased steelmaking rate. A modest increase for June tonnage is expected. But there's little market activity now on new orders.

Cincinnati—Market is balanced between supply and demand for the month. But a slight increase is expected in June. Some scrap has started moving from West Virginia and Kentucky by barge to Gulf ports for export.

St. Louis—Scrap prices remain unchanged; a slow market exists. The general feeling is that it will continue this way for the next month or two. Some say higher prices could develop later.

Birmingham — Strong dealer resistance to newly established mill prices is reported by brokers. They report difficulty filling orders placed last week by an electric furnace at $1.50 to $2 lower than last month's price. Foundries are out of the market.

Buffalo — Market seems to have stabilized at present prices. New purchases were made early this week at current levels.

Boston—Activity is off a little in both export and domestic buying. But prices remain unchanged.

West Coast—Market is confused as dealers hold back with hopes that prices will firm again. Major mills are still out of the market in San Francisco.

Houston — Weakness continues in this market. Some prices took another drop this week and the trade is not optimistic.

SCRAP PRICES *(Effective May 8, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	35.00 to 36.00
No. 1 factory bundles	40.00 to 41.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	40.00 to 41.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	37.00 to 38.00
Scrap rails, random lgth.	45.00 to 46.00
Rails, 2 ft and under	49.00 to 50.00
RR specialties	40.00 to 41.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	35.00 to 36.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	100.00 to 110.00
430 bundles and solids	80.00 to 85.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	40.00 to 41.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	43.00 to 44.00
Low phos. punch'gs plate, ½ in. and heavier	41.00 to 42.00
Low phos. 2 ft and under	39.00 to 40.00
No. 1 RR hvy. melting	39.00 to 40.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	57.00 to 58.00
Rails 2 ft and under	49.00 to 50.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	57.00 to 58.00
RR couplers and knuckles	44.00 to 45.00
No. 1 machinery cast.	47.00 to 48.00
Cupola cast.	42.00 to 43.00
Cast iron wheels	34.00 to 35.00
Malleable	46.00 to 47.00
Stove plate	37.00 to 38.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	100.00 to 105.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	41.00 to 42.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	40.00 to 41.00
Machine shop turn.	14.00 to 15.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	27.00 to 28.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	42.00 to 43.00
Heavy turnings	27.00 to 28.00
RR specialties	44.00 to 45.00
Rails, 18 in. and under	52.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	42.00 to 43.00
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	10.00 to 11.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	12.00 to 13.00
Low phos. 18 in. and under	37.00 to 38.00
Rails, random length	41.00 to 42.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast.	34.00 to 35.00
Heavy breakable cast.	28.00 to 29.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Low phos. plate	37.00 to 38.00

Cleveland

No. 1 hvy. melting	$32.50 to $33.50
No. 2 hvy. melting	23.00 to 24.00
No. 1 dealer bundles	32.50 to 33.50
No. 1 factory bundles	37.00 to 38.00
No. 2 bundles	21.50 to 22.50
No. 1 busheling	32.50 to 33.50
Machine shop turn.	12.00 to 13.00
Mixed bor. and turn.	15.00 to 16.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Cut structural & plates, 2 ft & under	37.00 to 38.00
Low phos. punch'gs plate	33.50 to 34.50
Drop forge flashings	32.50 to 33.50
Foundry steel, 2 ft & under	32.00 to 33.00
No. 1 RR hvy. melting	37.50 to 38.50
Rails 2 ft and under	48.00 to 49.00
Rails 18 in. and under	49.00 to 50.00
Steel axle turnings	26.00 to 27.00
Railroad cast.	47.00 to 48.00
No. 1 machinery cast.	47.00 to 48.00
Stove plate	38.00 to 39.00
Malleable	50.00 to 51.00
Stainless	
18-8 bundles	170.00 to 175.00
18-8 turnings	100.00 to 105.00
430 bundles	85.00 to 90.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structurals and plate, 2 ft and under	39.00 to 40.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	44.00 to 45.00
No. 1 cupola cast.	38.00 to 39.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	12.50 to 13.50
Shoveling turnings	14.50 to 15.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	36.00 to 37.00
Rails, random lengths	39.00 to 40.00
Rails, 18 in. and under	43.00 to 44.00
RR specialties	39.00 to 40.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	36.00 to 37.00
Elec. furnace, 3 ft & under	34.00 to 35.00
Bar crops and plate	43.00 to 44.00
Structural and plate, 2 ft	42.00 to 43.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	42.00 to 43.00
No. 1 cupola cast.	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	35.00 to 36.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 2 dealer bundles	18.00 to 19.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	20.00 to 21.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	29.00 to 30.00
Drop forge flashings	28.00 to 29.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	12.00 to 13.00
Cast iron borings	11.00 to 12.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	32.00 to 33.00
Automotive cast.	39.00 to 40.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	29.00 to 30.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	4.00 to 4.50
Shoveling turnings	9.50 to 10.00
Clean cast. chem. borings	15.50 to 16.50
No. 1 machinery cast.	40.00 to 41.00
Mixed cupola cast.	32.00 to 32.50
Heavy breakable cast.	28.00 to 29.00

San Francisco

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 1 dealer bundles	30.00
No. 2 bundles	25.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 cupola cast.	$45.00 to 46.00

Los Angeles

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 1 dealer bundles	31.00
No. 2 bundles	27.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	15.00
Elec. furnace 1 ft and under (foundry)	$48.00 to 50.00
No. 1 cupola cast.	45.00 to 46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	25.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$31.00
No. 2 hvy. melting cut 3 ft and under	28.00
No. 1 dealer bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Bush., new fact., prep'd	31.00
Bush., new fact., unprep'd	25.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	31.00
No. 2 bundles	24.00
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft & under	$47.00 to 48.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	29.00 to 30.00

Another Price Hike Expected in Copper

The copper price moved to 30¢ per lb on May 1.

Industry officials feel this was just the first move. Another increase is expected.

▪ Many in the copper industry feel the price will rise again.

American Smelting & Refining Co. paced the industry move to 30¢ per lb, from 29¢, on May 1.

"I was standing with the sales heads of several large copper companies when the price hike was announced," says a copper trader. "It was quite obvious they were surprised and, I think, a little disappointed at the size of the increase."

Selling Higher—Dealers are starting to sell copper at higher than the 30¢ producer and custom smelter price.

The squeeze is still not off the custom smelters. They must get about 5¢ more for their copper than they pay for No. 2 copper scrap, their raw material, to make any profit at all.

But copper scrap prices are still very high—and they are not getting it.

Costly Service—There have been many reports lately of smelters paying more than the market price for scrap they need in a hurry.

Another factor: Speculative areas of the copper market are banking heavily on higher copper prices. Both major futures markets, Commodity Exchange in New York and London Metals Exchange, are running far ahead of the current level.

High Demand—"The price has to go up, because the demand is there," says a copper dealer. He points out that European buyers seem to be sustaining their high level of buying. And the Japanese are bigger customers than ever.

The only question mark seems to be: Are European buyers preparing for possible trouble in Africa, or do they really need the metal now?

While the answer to this will have an influence on the copper picture this year, it bears little influence on short-term upward pressure on the price.

How High?—How much and how soon will the copper price go up?

Guesses on this vary widely. The consensus seems to be 1¢ to 2¢ per lb, with more expecting a 2¢ hike.

Some feel custom smelters will raise prices any day now. But generally, industry spokesmen believe suppliers will wait until they have an accurate appraisal of the market reaction to the first increase—at least another few weeks.

Aluminum

Business for aluminum distributors in the first quarter was better than both the previous quarter and the same period in 1960.

Survey Results—These are the conclusions from a recent survey of part of its membership by the National Assn. of Aluminum Distributors. The survey was by geographical area, and by mill product.

Best increase by product in the first quarter over the last quarter, 1960, was wire, rod, bar and structurals—up 16 pct nationally. But the Great Lakes area sold 3 pct less.

In North Atlantic states, warehouses moved 10 pct more sheet, plate and coils, 4 pct more wire, rod, bar and structurals.

1961 Outlook—Industry forecast for 1961: 11 pct better sheet, plate and coil sales; 6 pct better wire, rod, bar and structural sales; 1 pct better tubing sales; and 8 pct better extrusions and pipe sales.

One warehouseman says: "Business conditions in general appear to be improving, and we feel this trend should continue."

Tin Prices For the Week

May 2—107.625; May 3—108-.125; May 4—108.75; May 5—109.50; May 8—109.75*.
*Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in APRIL based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	29.00
Copper, Lake	29.00
Straits, Tin, New York	107.33
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.80
Aluminum ingot	26.00

Note: Quotations are on going prices

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12 17 59
Copper (E)	30.00	29.00	5 3 61
Copper (CS)	30.00	29.00	5 1 61
Copper (L)	30.00	29.00	5 2 61
Lead, St. L.	10.80	11.80	12 13 60
Lead, N. Y.	11.00	12.00	12 13 60
Magnesium Ingot	36.00	34.50	8 13 56
Magnesium pig	35.25	33.75	8 13 56
Nickel	74.00	64.50	12 6 56
Titanium sponge	150-160	162-182	8 1 59
Zinc, E. St. L.	11.50	12.50	1 12 61
Zinc, N. Y.	12.00	13.00	1 12 61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 185.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size*	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 3/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	48.77	49.06	48.71	52.93
Brass, Low	51.45	51.74	51.39	55.51
Brass, Rod	52.39	52.68	52.33	56.45
Brass, Naval	53.51	59.82	47.32	57.67
Muntz Metal	51.54	.....	46.85	.....
Comm. Bz.	53.88	.....	53.82	57.69
Mang. Bz.	57.27	.....	50.85	.....
Phos. Bz. 5%	75.87	75.62	76.37	77.80

Free Cutting Brass Rod 34.33

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb) ...$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb..... 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $203 to $205
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 31.25
- No. 120 ..... 30.50
- No. 123 ..... 29.75

80-10-10 ingot
- No. 305 ..... 35.25
- No. 315 ..... 33.00

88-10-2 ingot
- No. 210 ..... 43.00
- No. 215 ..... 39.75
- No. 245 ..... 35.00

Yellow ingot
- No. 405 ..... 26.75

Manganese bronze
- No. 420 ..... 29.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type)..26.00-27.00
No. 12 alum. (No. 2 grade)...22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)...24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot
- Grade 1—95-97½% 23.75-24.75
- Grade 2—92-95% 22.50-23.50
- Grade 3—90-92% 21.50-22.50
- Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	19⅞	18
Red brass	23	22¼
Comm. bronze	23⅞	23⅛
Mang. bronze	18¾	18
Free cutting rod ends.	19	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 28
- No. 2 copper wire 26
- Light copper 23¾
- *Refining brass 25
- Copper bearing material 24

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 28
- No. 2 copper wire 26
- Light copper 23¾
- No. 1 composition 23½
- No. 1 comp turnings 23
- Hvy yellow brass solids 17½
- Brass pipe 16
- Radiators 18½

Aluminum

- Mixed old cast. ..... 12½—13
- Mixed new clips ..... 14½—15
- Mixed turnings, dry ..... 13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 24¼—24¾
- No. 2 copper wire ..... 22¾—23¼
- Light copper ..... 20¼—20¾
- Auto radiators (unsweated).. 16 —16½
- No. 1 composition ..... 19½—20
- No. 1 composition turnings... 18½—19
- Cocks and faucets ..... 16½—17
- Clean heavy yellow brass ... 13 —13½
- Brass pipe ..... 16½—17
- New soft brass clippings .... 15¾—16¼
- No. 1 brass rod turnings .... 15¾—16¼

Aluminum

- Alum. pistons and struts .... 7 — 7½
- Aluminum crankcase ..... 9½—10
- 1100 (2s) aluminum clippings 12¼—12¾
- Old sheet and utensils ..... 9½—10
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 10 —10½
- 2020 (24s) clippings ..... 11 —11½

Zinc

- New zinc clippings ..... 5½— 5¾
- Old zinc ..... 3½— 4
- Zinc routings ..... 1¾— 2
- Old die cast scrap ..... 1¾— 2

Nickel and Monel

- Pure nickel clippings 52-54
- Clean nickel turnings 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7¼— 7¾
- Battery plates (dry) ..... 3 — 3¼
- Batteries, acid free ..... 2 — 2¼

Miscellaneous

- Block tin ..... 78 —79
- No. 1 pewter ..... 59 —60
- Auto babbitt ..... 44 —45
- Mixed common babbitt ..... 9½—10
- Solder joints ..... 14½—15
- Small foundry type ..... 8½— 9
- Monotype ..... 8¾— 9¼
- Lino. and stereotype ..... 8 — 8¼
- Electrotype ..... 7½— 7¾
- Hand picked type shells ..... 5¼— 5¾
- Lino. and stereo. dross ..... 1¾— 2¼
- Electro dross ..... 2 — 2½

(Effective May 8, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1, T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W3*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective May 8, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

Holloware Enameling
29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.

* Electrogalvanized sheets. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective May 8, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*	5.00 *A8*									8.00 *A8* 8.35 *M4*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective May 8, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	7.87	9.71	10.16	11.35	9.70	9.95	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.59	9.45	8.41	8.47	8.26	13.14	16.76	16.65	.....	.....
Boston	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.79	21.89	21.14
Buffalo	.15	8.70	9.45	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58[6]	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		10.17	10.98	11.35[3]	11.73	9.41	9.81	9.58	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	11.20	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	10.95	11.44	9.47	9.82	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.49
New York	.10	9.77	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.90	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	12.40	10.55	11.00	9.45	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅜"; cold drawn—15/16" to 2⅜" round; Hot-rolled 4140—⅝" to 2⅜" round, cold drawn—15/16" to 2⅜" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective May 8, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	6..00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.00	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	73.00
Lyles, Tenn. *T3*	.....	.....	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1*, *I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75-21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25-26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00-31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25-31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25-29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; Vandergrift, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Detroit, *M2*; Louisville, O., *R5*.

Strip: Midland, Pa., *C11*; Waukegan, Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville Pa., *U2*; Detroit, *M2*; Detroit, *S1*; Canton, Massillon, O., *R3*; Harrison, N. J., *D3*; Youngstown, *R5*; Sharon, Pa., *S1*; Butler, Pa., *A7*, Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13*, (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1*, (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7*; S. Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R5*; S. Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*, *R3*; Ft. Wayne, *I4*; Detroit, *R5*; Gary, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Ambridge, Pa., *B7*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Newark, N. J. *D2*, Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*; Detroit, *R5*; Reading, Pa., *C2*; Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*; S. Chicago, *U1*.

Plates: Ambridge, Pa., *B7*; Baltimore, *E1*; Brackenridge, Pa., *A3*, Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Vandergrift, Pa., *U1*; Gary, *U1*.

Forging billets: Ambridge, Pa., *B7*; Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*; Munhall, Pa., S. Chicago, *U1*; Owensboro, Ky., *G5*; Bridgeport, Conn., *N8*; Reading, Pa., *C2*.

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	2	5	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	...	...	...	...	...	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	...	...	...	...	...	9.00	9.55
Chicago *W7*	173	...	.	...	...	9.00	9.55†
Cleveland *A6*	...	...	...	...	...	...	...
Cleveland *A5*	...	...	...	...	...	9.00	...
Crawf'dsv. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	...	...	...	...	...	...
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	...	...	...	...	...	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	...	...	...	...	...	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	...	...	...	236	...	9.95	10.50
SparrowsPt. *B3***	175	...	...	215	198	9.10	9.775
Struthers, O. *Y1**	...	...	...	...	...	8.65	9.20
Worcester *A5*	179	...	...	...	...	9.30	9.85‡
Williamsport *S5*	...	...	...	...	...	...	...

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

(Effective May 8, 1961)

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.) Connellsville, Pa.	Net Ton $14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

Rear-pump body for automatic transmission cast from gray iron using shell-molds and -cores.

modern shell-mold casting for:

IMPROVED ACCURACY

Size and location of the oil ports in the pump body illustrated are maintained within *a tolerance of 0.015 inch* by using shell-cores.

SMOOTHER FINISHES

Faithful reproduction obtained with shell-molds, and the absence of burnt-in sand reduce the amount of machining and finishing required.

GREATER RELIABILITY

Carefully controlled analysis plus precise heat-treating in our own modern facilities insure uniformly high quality and dependability.

OVERNIGHT DELIVERY WITHIN 500 MILES | to fill your IMMEDIATE NEEDS for QUALITY PRECISION CASTINGS at LOWER COST

GL GREAT LAKES FOUNDERS & MACHINE CORP.
LUDINGTON, MICH.

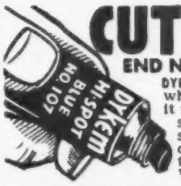
Specialists in Stack, CO_2, and Shell-Mold Casting

DYKEM STEEL BLUE
Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2303G North 11th St. • St. Louis 6, Mo.



CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2303-G NORTH 11TH ST., ST. LOUIS 6, MO.

GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex) 31.50
0.010% C max, 63-66% Cr, 5-7% Si. 32.50
0.010% C max, 68-71% Cr, 2% Si max 31.50
0.25% C max 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	22.50	14.60
Ton lots	30.45	16.05
Less ton lots	33.40	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19% ..	$98.00	$96.00	$100.50
19-21% ..	100.00	98.00	102.50
21-23% ..	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe ..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.
50% Si.... 14.60 75% Si.... 16.90
65% Si.... 15.75 85% Si.... 18.60
90% Si.... 20.00

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

(Effective May 8, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb
Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

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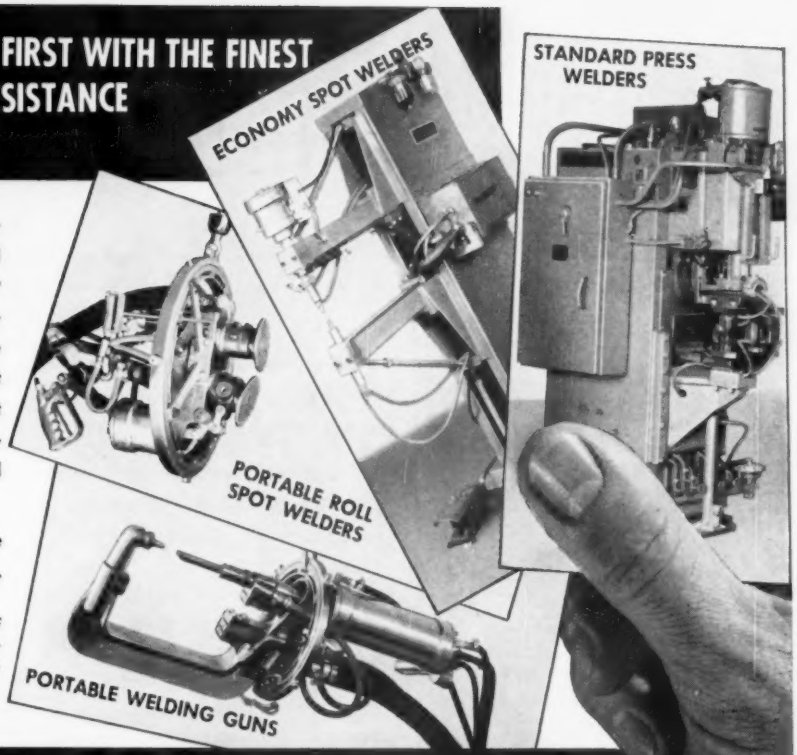
Over twenty-five years of outstanding experience in the welding field makes Progressive your best bet for the finest resistance welding equipment and fixtures. A dependable part of the welding picture in almost every important manufacturing plant here and abroad, Progressive equipment has proved its quality and superiority right on the job.

Our engineers will gladly assist in the solution of your production problems.

Shown here are a few examples of Progressive's many types of equipment for every welding requirement.



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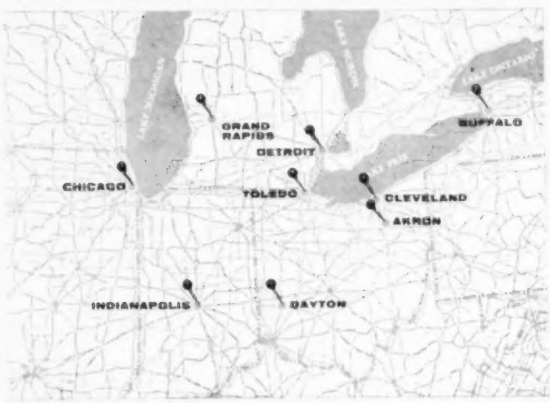

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Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI. 8P.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2300	3600
2	500	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRET	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1778
1	550	Whse.	CW	440	852
1	500	Whse.	CW	550	850
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP-561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	850
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE 13B	220	1890
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2200	580
1	200	G.E.	IM	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

3	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2200	3600
1	500	Whse.	CS-1115	2300	863/445
2	500	Whse.	CSP-583H	440	3600
4	500	A.C.	ARW	2300	3600
4	500	Whse.	CS-1216	2200	500
2	450	Ell.	F-3910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3565
1	300	Cont.	NL-6868	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

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100-TON WHITING DROP PIT TABLE

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51-8 E. 42nd St. New York 17, N. Y. Ph. YUkon 6-4766

Pittsburgh Dealers Await Recovery

Used machinery dealers in Pittsburgh say activity is still below standard.

Steel mills aren't yet in the mood for heavy spending. It could take six months.

■ The recovery has not yet reached Pittsburgh used machinery dealers.

Even the lines that normally respond quickly to an increase in general activity show little change. One supplier of electrical equipment feels a lot of business is being held up until Congress acts on the tax credit program.

In support of this view, the dealer points out a number of jobs have been approved and appropriations made but companies are still holding back orders. The explanation given is that management wants to make sure it is taking full advantage of new tax benefits.

But the top purchasing man for a steel mill doubts that the tax situation is a factor. He says his own company is spending all it can under present conditions. He doubts that there will be any sudden wave of projects when the proposed incentives are installed.

No Real Recovery—A supplier of general equipment says there is a little more business, but no real recovery. He is disappointed by the lack of response so far.

"I make my calls and people say they're not in the mood or the position to buy yet."

Another general supplier has had a few sales. Recent orders have included pipe threaders, leveling lines and small machine tools. However, there has been no real improvement. Even inquiries are off.

Steel mill equipment is looking a little better. One dealer sold a number of cold mills and quite a bit of miscellaneous equipment. This dealer finds a better feeling generally.

Quite Satisfied — "I feel a lot more comfortable about things than I did a month ago," he says. "I think we're quite satisfied with the current rate of activity."

A supplier of machine tools is far from satisfied. He reports a continued period of slow sales. Customers are bargain hunting. They are looking for late models at low prices. They are in no hurry to buy and are taking the time to shop around. Sales come only when a prospect finds a real bargain or develops an urgent need.

"Most of them are waiting for business to get a little more solid," says the dealer.

A similar thought is expressed by a purchasing man for a stamping plant.

ELECTRICAL POWER EQUIPMENT

SQUIRREL CAGE MOTORS

3 ph. 60 cy. 220 or 440 volts

(*2200 volts or higher)

HP	RPM	MAKE	VOLTS	TYPE
1500	1800	AL.-Ch.	2300	Ventilated
1250	3600	AL.-Ch.	4000	DP/FF
800	600	West.	2300	CS-44
600	600	West.	2300	CS-12
500	1800	G.E.	2300	KT-565Y
500	1200	G.E.	2300	FT-567
350	3600	Cr.-Wh.	440	SC-68
350	1200	West.	440	CS-22556H
200	900	West.	440	CS-8748
200	720	G.E.	440	KF-5648

SLIP RING MOTORS

3 ph. 60 cy. 220 or 440 volts

HP	RPM	MAKE	VOLTS	TYPE
1500	514	AL.-Ch.	2300	Mill
1000	1200	AL.-Ch.	4000	Any
1000	900	AL.-Ch.	2300	Any
600	1800	G.E.	4160	M-6345-8
500	1200	G.E.	440	M-6345-Z
500	900	G.E.	440	IM
350	1800	AL.-Ch.	2300	ARY
250	720	G.E.	4000	IM
200	720	G.E.	2300	MT-566

MOTOR GENERATOR SETS

KW	MAKE	MOTOR A.C.V.	GENERATOR D.C.V.
1750	G.E.	4160/2300	250/300
1000	West.	4160/2300	250
750	G.E.	4160/2300	250
600	G.E. (3 unit)	2300/440	125/250
500	G.E.	2300	250
400	AL.-Ch.	2300/440	125/250
250	G.E.	2300	250

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No. 1/2, No. 1 1/2 Buffalo Univ. Ironworkers, M.D.
No. 5 Johnson Geared O.B.I. Press. Late.
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An asterisk indicates that a booklet, or other information, is offered in the advertisement.

This index is published as a convenience. No liability is assumed for errors or omissions.

A

*Accurate Perforating Co. 179
*Aldrich Pump Co. 21
Allen Mfg. Co. 92
*Aluminium Limited Sales Inc. ..58-59
American Gas Association 70
American Optical Co. 145
*American Pulverizer Co. 133
American Shear Knife Co. 66
Amplex Div. Chrysler Corp. ..146-147
*Armstrong-Blum Manufacturing Co. 175
*Armstrong Bros. Tool Co. 181
Atlas Car & Mfg. Co. 174
Atlas Steels, Ltd. 161
*Avey Div. 138

B

Bearings, Inc. 4
Belyea Co., Inc. 194
Bendix Corp., Industrial Controls Section 42-43
Bertsch & Co. 198
Beryllium Corp. 149
Bethlehem Steel Co. 1
Bower Roller Bearing Div., Federal-Mogul-Bower Bearings, Inc. 16
*Bullard Co. 90
*Bullard, E. D. Co. 179

C

Carlson, G. O. Inc. 27
*Cerand Corp. 167
Chicago Electric Co. 195
Cincinnati Milling Machine Co., Cincinnati Milling Products Div. 143
Cincinnati Milling Machine Co., Cincinnati Grinding Wheels 10
*Cincinnati Shaper Co. 61
Clark Controller Co. 49
Cleveland Tramrail Div., Cleveland Crane & Engineering Co. 65
Colorado Fuel & Iron Corp. 52-53
Consumers Steel & Supply Co.... 197
Continental Steel Corp. 176
Copperweld Steel Co., Superior Steel Div. 119
Crane Hoist Engineering Corp. . 196
Crucible Steel Co. of America .. 155
*Cullen-Friestedt Co. 138
*Curtiss-Wright Corp., Princeton Div. 127, 157

D

Decatur Casting Co. 24
*Denison Engineering Div., American Brake Shoe Co. 38
*Detrex Chemical Industries, Inc. 126
Diehl Mfg. Co. 47
Dixie Bearings, Inc. 4
Donahue Steel Products Co. 197
Dracco Div., Fuller Co. 44
*Drop Forging Association 33
*duPont, E. I. deNemours & Co., Inc. 131-132
Duraloy Co. 170
*Dykem Co. 191

E

Electric Furnace Co. 102
Evans Cooperage Co., Inc. 197
Eveready Supply Co. 195

F

Falk Machinery Co. 195
*Federal Bearings Co., Inc. 39
*Fellows Gear Shaper Co. 31
*Foote Mineral Co. 54-55
Forging Equipment Co. 195
Foster, Frank B. Inc. 196
*Foxboro Co. 64
*Fuller Co. 67

G

*Gardner-Denver Co. 173
Gardner Machine Co. 85
Gibson & Co., T. M. 196
Gilbert Merrill Steel Corp. 197
*Gleason Works 151
Glidden Co. 46
Goss & DeLeeuw Machine Co. ... 191
Gray, G. A. Co. 28-29
Great Lakes Founders & Mch. Corp. 191
*Greenlee Bros. & Co. 94

H

*Hansen Mfg. Co. 99
Harris Foundry & Machine Co. .. 96
Heat & Power Co., Inc. 195
Hepburn, John T., Ltd. 153
*Hewitt-Robins 34-35
Hitachi, Ltd. 139
*Hitchiner Mfg. Co., Inc. 125
*Horsburgh & Scott Co. 130
*Houghton, E. F. & Co. 51
Hughes, Arnold, Co. 195, 197
Hyman, Joseph & Sons 195

I

Illinois Gear & Machine Co. 159
Industrial Distributors, Ltd. 40-41
Ingersoll-Rand Co. 104
Iron & Steel Products, Inc. 194

EQUIPMENT AND MATERIALS WANTED

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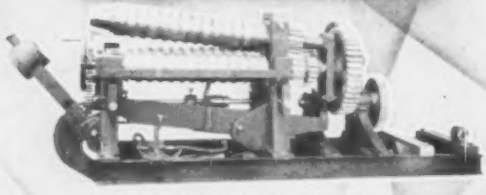

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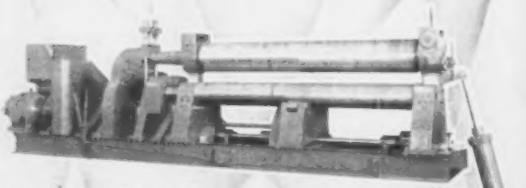

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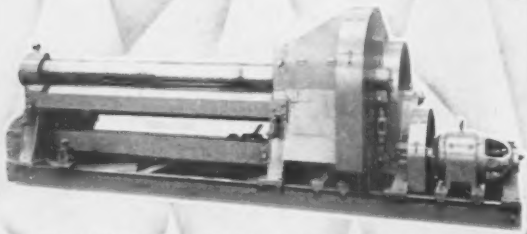

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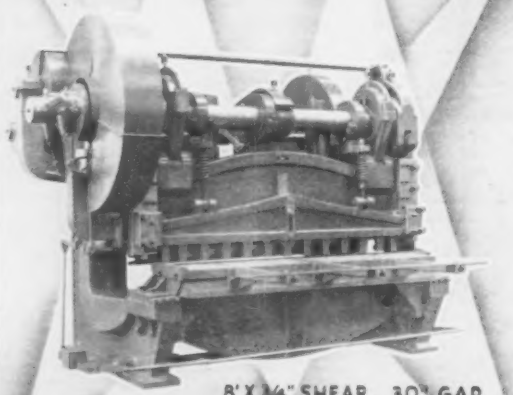

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CAMBRIDGE CITY INDIANA

J

*Jeffrey Mfg. Co. 137
*Jomac, Inc. 26

K

Kaiser Steel Corp. 196
*Kano Laboratories 179
*Kennametal Inc. 18

L

Lang Machinery Co., Inc. 195
*Leeds & Northrup Co. 30
*Lodge & Shipley Co. 144
*Lord Chemical & Equipment Div. 166

M

McKay Machine Co. 128-129
McLouth Steel Corp. 17
*Mac Whyte Co. 171
Malayan Tin Bureau 158
*Mansbach Steel Co. 172
Marathon Specialty Steels, Inc. ... 163
*Minnesota Minning & Mfg. Co. Coated Abrasives Div. 152
Moltrup Steel Products Co. 157
Morse Twist Drill & Mch. Co. ... 32
*Mundt, Chas. & Sons 193

N

*National Broach & Machine Co. 6
National Machinery Co. 56
New England High Carbon Wire Corp. 160
*Niagara Machine & Tool Works 25

O

Oakite Products, Inc. 140
*Ohio Knife Co. 98
Olin Mathieson Chemical Corp. 134-135

P

Pangborn Corp. ... Inside Back Cover
*Pannier Corp. 168
Parker Rust Proof Co. 123
Peninsular Steel Co. 193
*Pennsalt Chemicals Corp. 50
*Perkins, B. F., & Sons, Inc. 160
Picker X-Ray 160-161
Pittsburgh Metals Purifying Co. ... 120
Pollock Industries, Inc. 194
*Porter, H. K. Co., Inc. 100-101
Progressive Welder & Mfg. Co. . 193

R

Reading Industrial Equipment Corp. 195, 196
*Republic Steel Corp. 62-63
Revere Copper & Brass, Inc. 12
*Riverside-Alloy Metal Div., H. K. Porter Co., Inc. 100-101
Roebling's, John A. Sons, Div. Colorado Fuel & Iron Corp. .. 165
*Rolled Alloys Inc. 136
Ryerson, Jos. T. & Sons, Inc. ... 36-37

S

Sandusky Foundry & Machine Co. 60
*Shepard Niles Crane & Hoist Corp. 156
Southern Screw Co. 19
*Spraying Systems Co. 157
Stamco, Inc. 154
Stanhope, R. C. Inc. 195
*State of Ohio, Dept. of Industrial & Economic Development 22
Steel & Tube Div., Timken Roller Bearing Co. ..... Back Cover
Struthers Wells Corp. 195
Superior Steel, Div. Copperweld Steel Co. 119
Surface Combustion, Div. Midland Ross Corp. 57
Swepco Tube Corp. 48

T

*Taft-Peirce Mfg. Co. 162
Timken Roller Bearing Co. Steel & Tube Div. ..... Back Cover
Tinnerman Products Inc. 14
*Titan Metal Mfg. Co. Div., Cerro Corp. 74
Torrington Co. 88
*Torrington Mfg. Co. Inside Front Cover
Tractor & Equipment Co. 196

U

Union Carbide Metals Co., Div. Union Carbide Corp. 72
United Engineering & Foundry Co. 87
Universal-Cyclops Steel Corp. .. 45
Universal Machinery & Equipment Co. 195
*Urick Foundry Co. 164

V

Valley Steel Products Co. 197
Vascoloy-Ramet Corp. 169
Voss Engineering Co. 71

W

Wallack Bros. 197
Wallingford Steel Co. 20
Ward Steel Co. 153
Weiss Steel Co. Inc. 197
Wheelock, Lovejoy & Co., Inc. .. 142
*Whiting Corp. 23
Wickwire Spencer Steel Div. Colorado Fuel & Iron Corp. .. 52-53
*Wrought Washer Mfg. Co. 150
Wyckoff Steel Co. 148
Wysong & Miles Co. 8

Y

*Youngstown Foundry & Machine Co. 141
Youngstown Sheet & Tube Co. . 68-69

CLASSIFIED SECTION

Clearing House 194-196
Contract Manufacturing Appears in first and third issue of each month. See May 18, 1961 issue
Employment Exchange 197
Equipment & Materials Wanted .. 196

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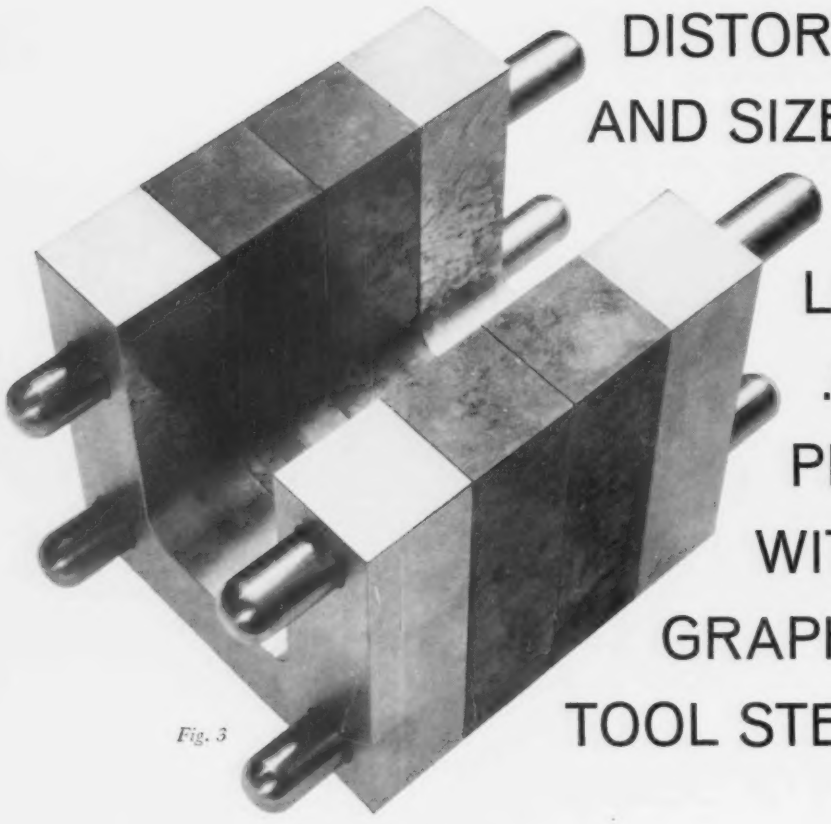

Fig. 3

The test pieces pictured here demonstrate the dimensional stability of Graph-Air® tool steel that enables users to produce more intricate tools and dies.

Fig. 1 shows test piece dimensions. In the "U" shape, which is particularly sensitive to distortion in heat treating, the machining tolerance between any two holes is held to .0002". After heat treating, the specimens are fitted together by four pins having a diameter of .0003" under .500". The total assembly error under these circumstances could not exceed .0008". Distortion must be less than .0002" per inch during heat treatment for the pins to fit.

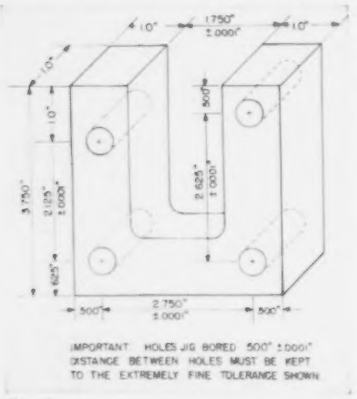

Fig. 1

The Graph-Air pieces tested were from different heats. They were air hardened from 1450°F. and double tempered at 400°F. Fig. 2 shows them as they pegged together easily, demonstrating no distortion. Fig. 3 top, shows the same specimens compared with two green, or as machined, parts. They matched perfectly again. *Graph-Air did not distort . . . did not change size.* Records indicate that no other tool steel passed this test when heat treated at its recommended hardening and tempering conditions.

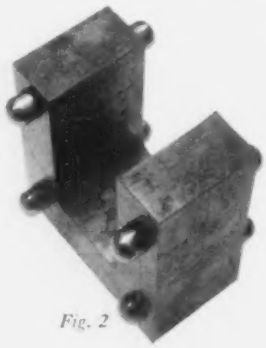

Fig. 2

Specify Graph-Air where minimum distortion and high quality are required. Solid and hollow bar sizes available. It is one of the Timken graphitic tool steels, the most stable tool steels made. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

TIMKEN®

***Fine Alloy* STEEL**

TIMKEN GRAPHITIC STEELS ARE AVAILABLE FROM STEEL SERVICE CENTERS IN 44 CITIES IN THE UNITED STATES AND CANADA